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Exploring Distinct Aspects of Shame and Guilt: Can Startle Reflex Modification Differentiate Shame from Guilt?

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Abstract

Despite the similarities between shame and guilt, there is a growing body of evidence that shame and guilt are distinct emotional constructs. Guilt, despite its negative valence, is frequently associated with approach motivation, whereas shame is associated with withdrawal motivation. Research shows that engagement of the approach motivational system yields attenuation of the defensive startle reflex, but that activation of the withdrawal motivation system augments the startle reflex. Thus, approach-related guilt and withdrawal-related shame should attenuate and augment the startle magnitude, respectively. To test this prediction, 68 participants imagined scripts of four different affective conditions (i.e., shame, guilt, neutral, positive). Startle response, heart rate (HR) activity, skin conductance (SC), and self-report affective data were collected. Both shame and guilt scripts were rated as unpleasant and arousing but the shame script was rated as more unpleasant than the guilt script. Contrary to prediction, no significant difference in startle response magnitude between shame and guilt emerged. Startle response magnitude of shame and guilt was significantly larger than neutral and positive. These findings are discussed in the context of the startle response and the need for additional research that could more directly address the question of approach versus avoidance motivation.

Exploring Distinct Aspects of Shame and Guilt:

Can Startle Reflex Modification Differentiate Shame from Guilt?

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Dimensional views of emotion assume that affective experiences vary with respect to a small number of dimensions. Valence (i.e., pleasure-displeasure) and arousal have been identified as the principal dimensions of emotion (Russell, 1979; Schlosberg, 1954; Watson, Wiese, Vaidya, & Tellegen, 1999), among some others (e.g., dominance, potency, engagement; see Osgood, 1969; Russell, 1978; Schlosberg, 1952). For example, Russell (1980) proposed that affective words are categorized as a circumplex pattern with valence and arousal accounting for about 70% of the total variance in affective experience. In addition, people categorize facial expressions of others into different dimensions according to their own perceptions of valence and arousal of the facial expressions (Abelson & Sermat, 1962). Even some "basic emotions" theorists (e.g., Izard, 2007; Panksepp, 2007) agree that a dimensional view of emotion has some merit. In fact, considering the two different approaches (i.e., dimensional and basic emotion views) simultaneously may better describe and explain emotional experience (e.g., Diener, Smith, & Fujita, 1995; Shaver, Schwartz, Kirson, & O'Connor, 1987). For example, from a "basic emotions" point of view, fear and joy are discrete emotions due to different patterns of physiological responses (e.g., heart rate, blood pressure, skin conductance) (e.g., Cook, Melamed, Cuthbert, McNeil, & Lang, 1988); in addition to the distinctive patterns of physiological responses, people also differentiate these two emotions from each other according to each emotion's relative position on the axes of valence and arousal (e.g., Russell, 1979). It is noteworthy that in characterizing emotions physiological response and appraisal of dimensions are often deployed (e.g., Vrana, 1994; Witvliet & Vrana, 1995). For example, unpleasant and highly arousing emotions could be accompanied by different patterns of physiological responses

compared to emotions characterized by displeasure and low arousal, pleasure and high arousal, or pleasure and low arousal .(e.g., Cook, Hawk, Davis, & Stevenson, 1991; Miller, Patrick, & Levenston, 2002). Therefore, if two emotions are positioned in the same dimensions of valence and arousal, similar patterns of physiological responses between them could be expected. If so, these two emotions could be classified into a similar category without discernible distinction in terms of the underlying pattern of physiological responsivity.

Numerous affective studies have reported that shame and guilt, which involve heightened self-consciousness (Tracy, Robins, & Tangney, 2005), are equally unpleasant and arousing (e.g., Frijda, Kuipers, & Schure, 1989; Roseman, Wiest, & Swartz, 1994). In addition, shame and guilt are often experienced simultaneously (e.g., Hooge, Zeelenberg, & Breugelmans, 2007). Shame and guilt are also similar in that no distinctive pattern of facial expression characterizes either (Ekman & Friesen, 1975). Partly due to these similarities, guilt is often used as a generic term for both guilt and shame. Furthermore, because they are equally unpleasant and arousing, no idiosyncratic physiological response patterns should be uncovered, especially in terms of autonomic responses (e.g., HR, SC), which could challenge a perspective holding that shame and guilt are distinct emotions. However, there is growing evidence that shame and guilt are distinct emotional constructs. For example, shame and guilt are associated with different appraisal patterns (e.g., Brown & Weiner, 1984; Covington & Omelich, 1984; Jagacinski & Nicolls, 1984; Weiner, 1985). Shame and guilt also diverge in their associations with self-reported depressive symptoms (e.g., Tangney, 1995; Tangney, Wagner, & Gramzow, 1992; see Kim, Thibodeau, & Jorgensen, 2011 for further discussion). The approach versus withdrawal motivational underpinnings of shame and guilt are also thought to be different. Indeed, Lewis (1971) outlined a theoretical framework in which shame is linked to withdrawal-related behavioral patterns and

guilt is linked to approach-related behavioral patterns. The current study aims to test this theoretical framework by using a tool (i.e., the startle probe) sensitive to motivational direction (viz., approach versus avoidance) to explore the motivational basis of shame and guilt.

Shame and Guilt: Distinct Emotions

Despite some similarities between shame and guilt mentioned above, two different theoretical frameworks suggest that shame and guilt should be distinct with respect to motivational direction and other dimensions. According to Lewis (1971), the focus of blame is different in shame versus guilt; shame is about the global *self* (e.g., *I* am *bad*), whereas guilt is about specific *thing* done (e.g., I did *bad thing*). The whole self (i.e., broadly defined as "self-perception"; see Watson, 2004) is devalued with shame, whereas the offensive action is criticized with guilt. Accordingly, shamed individuals wish they could change qualities of the self to dissipate the feelings of shame (Niedenthal, Tangney, & Gavanski, 1994). Lewis further reasoned that due to the different levels of task difficulty dissipating shame and guilt, withdrawal-oriented (e.g., escape from disapproval) and approach-oriented (e.g., repairing wrongdoings) behavioral patterns would be prompted by shame and guilt, respectively. Since it should be challenging to transform the devalued whole self, a greater urge to hide or escape could be easily understood as an essential part of the shame experience. In contrast, focusing on and blaming a specific action done, a guilty individual would be more motivated to make amends to diminish the feelings of guilt, action that is consistent with approach motivation.

In addition, an evolutionary framework also argues for heightened submissiveness (i.e., increased withdrawal motivation) in shame (Gilbert, 1997, 2003). From an evolutionary point of view, "shame serves to alert the self and others to detrimental changes in social status" (Gilbert, 1997, p. 114). Therefore, one's *relative* social status (i.e., inferiority versus superiority) is a key

determinant of the shame experience, and shame corresponds to the sense of inferiority. Gilbert proposed that submissive behavioral patterns such as hiding, escaping and avoiding eye gaze are prompted by shame because these behaviors clearly signal one's defeat or inferior status to prevent further attacks from a dominant.

The above two theoretical frameworks suggest links between shame and withdrawal behavioral tendencies on the one hand and guilt and approach behavioral tendencies on the other. In fact, numerous studies largely based on self-report data support the proposed links (e.g., Barrett, Zahn-Waxler, & Cole, 1993; Donatelli, Bybee, & Buka, 2007; Frijda et al., 1989; McGraw, 1987; Roseman et al., 1994; Tangney, Miller, Flicker, & Barlow, 1996; Zeelenberg & Breugelmans, 2008). For example, people express a greater tendency to feel inferiority and passivity, accompanied by increased desire to hide, in shame compared to guilt (Wicker, Payne, & Morgan, 1983). In contrast, a greater desire to confess one's wrongdoings and make amends is associated with guilt (Lindsay-Hartz, 1984), which positively contributes to the quality of interpersonal relationships (see Baumeister, Stillwell, & Heatherton, 1994). Considering that maintaining satisfying interpersonal relationships is a critical goal (Baumesiter & Leary, 1995), people would be fundamentally motivated to actively seek possible ways of "setting things right" rather than hiding or escaping. In addition, empathy that motivates approach-oriented behaviors (e.g., wanting to help someone in trouble; Harmon-Jones, Peterson & Vaughn, 2003) is positively correlated with guilt (e.g., Leith & Baumeister, 1998; Tangney, 1991).

The theoretical frameworks and the empirical data described above are consistent with the notion that shame and guilt are distinct emotional constructs. They appear especially distinct in terms of motivational direction: shame corresponds to withdrawal motivation whereas guilt corresponds to approach motivation. It is worth noting that affective science historically

proposes motivational systems (e.g., approach or withdrawal) as a valid dimension of emotion (see Lang, 1994) in addition to the valence and arousal (e.g., Russell, 1979). In other words, emotions can be differentiated from each other according to their respective motivational state even though they are in the same dimensions of valence and arousal, which supports the proposed distinction between shame and guilt. The purpose of proceeding section is to review the proposition of motivational systems of emotion.

Motivational Systems of Emotion

In addition to the nature of emotion (i.e., what is emotion?), the function of emotion (i.e., what does emotion do?) has been a central theme of affective science (see Nesse & Ellsworth, 2009 for a review). It is now widely accepted that emotions are differentiated corresponding to the functions they serve (e.g., Graham, 1988; Watson et al., 1999). In this functional approach, emotions are adaptive and advantageous because they promote fitness or survival by motivating action appropriate to address the situation (Leeper, 1948). For example, in situations involving threat, fear motivates escape behavior (Roseman et al., 1994). There exists a linkage between emotion and behavior, more precisely "action readiness," and this linkage is attributed to the motivational nature of emotion (Frijda, 1986). Therefore, in addition to the parameters of valence and arousal, motivational factors also organize emotional experience (Lang, 1994). For example, fear and jealousy are both appraised as unpleasant, but, unlike jealousy, fear is accompanied by a heightened desire to withdraw (Frijda et al., 1989). Since motivation concerns the direction of behavior (Brehm & Self, 1989), the vast array of motivated behavior can be classified as either approach-oriented (i.e., seeking incentives or rewards) or withdrawal-oriented (i.e., avoiding danger or punishment) (Schneirla, 1959). Therefore, shame and guilt could be categorized as

reflecting approach and withdrawal motivation because withdrawal (e.g., hiding) and approach (e.g., making amends) behaviors are prompted by shame and guilt, respectively.

However, it should be noted that traditional views of the relationship between emotion and approach/withdrawal motivation hold that pleasant emotion is associated with approach motivation whereas unpleasant emotion like shame and guilt is associated with withdrawal motivation. Several diverse lines of research converge on this view. Chen and Bargh (2009) found that approach (e.g., pulling a lever inward) responses are more rapidly prompted by positive compared to negative valence stimuli, but that avoidance (e.g., pushing a lever outward) responses are more rapidly prompted by negative compared to positive valence. Roseman and his colleagues (1994) reported that withdrawal behavioral tendencies (e.g., feeling like running away or moving away from something) are often activated by fear, frustration, and disgust, which are prototypical unpleasant emotions. In contrast, approach behavioral tendencies (e.g., obtaining reward) are primed by classic pleasant emotions such as joy and pride (Roseman, Spindel, & Jose, 1990). Furthermore, pleasant emotion broadens the span of attention and action, which encourages approach-oriented behaviors (e.g., active goal seeking; Fredrickson, 1998; Fredrickson & Branigan, 2005; Fredrickson & Losada, 2005).

Some neurophysiological research is also instructive. First, electroencephalographic (EEG) studies of motivation show that the left and right frontal cortices mediate approach and withdrawal motivation, respectively (Fox et al., 1995; Kinsbourne, 1988; Silberman & Weingartner, 1986; Sutton & Davidson, 1997; see Davidson, 1998 for a review). For example, Harmon-Jones and Allen (1997) reported that greater left frontal cortical activity is associated with approach-related dispositional tendencies. There is also empirical evidence to support an association between EEG asymmetry and the valence of emotion (e.g., Buss, Schumacher,

Dolski, Kalin, Goldsmith, & Davidson, 2003; Davidson & Fox, 1989; Fox et al., 1995; Kalin, Larson, Shelton, & Davidson, 1998; Kang, Davidson, Coe, Wheeler, Tomarken, & Ershler, 1991; Tomarken, Davidson, & Henriques, 1990). For example, Tomarken, Davidson, Wheeler and Doss (1992) reported that individuals with relatively greater left frontal activation tend to experience increased generalized pleasant emotion but decreased unpleasant emotion compared with individuals with greater right frontal activation. Facial expressions of fear, disgust, or sadness result in relatively larger right frontal activation, whereas facial expression of joy generates relatively greater left frontal activation (Coan, Allen, & Harmon-Jones, 2001). In addition, simple right hand contraction that generates increased left frontal cortex activity results in an increased level of pleasant emotions (Harmon-Jones, 2006).

Second, startle reflex research provides additional evidence of the associations between emotional valence and motivational direction. The startle reflex is a defensive reflex that is elicited in response to a sudden, unexpected stimulus (Dawson, Schell, & Bohmelt, 1999). The magnitude of the startle reflex is facilitated during withdrawal motivational states and inhibited during approach motivational states (Drobes, Miller, Hillman, Bradley, Cuthbert, & Lang, 2001; see Lang, Bardley, & Cuthbert, 1998 for a review). The effects of emotional states on startle modification have been widely examined (see Lang, 1995 for a review). Unpleasant emotion facilitates the startle reflex whereas pleasant emotion inhibits the reflex (e.g., Jackson, Malmstadt, Larson, & Davidson, 2000; Yartz & Hawk, 2002; see Bradley, Cuthbert, & Lang, 1999 for a review). For example, Vrana, Spence, and Lang (1988) reported that participants' startle reflex magnitudes were largest during vewing unpleasant pictures and smallest during viewing of pleasant pictures. The same patterns of affective startle modification have been found in studies using emotional imagery tasks (e.g., Cook et al., 1991; Vrana, 1994). For example, the

magnitude of startle reflex is larger while participants imagine fearful scripts versus neutral scripts (Vrana & Lang, 1990).

In sum, pleasant and unpleasant emotions seem to motivate approach and withdrawal behaviors, respectively, which challenges the proposition that shame and guilt are motivationally distinct. However, recent research has begun to illuminate instances in which this general pattern does not hold. Is it possible that pleasant emotion is sometimes associated with withdrawal motivation, or that unpleasant emotion is sometimes associated with approach motivation?

Not All Unpleasant Emotions are Withdrawal-Related

As illustrated before, the vast array of motivated behaviors can be simply categorized reflecting as either approach or withdrawal (e.g., Schneirla, 1959). Two different biobehavioral systems have been proposed to mediate the wide range of motivated behaviors; one corresponding to approach (i.e., approach system), the other corresponding to withdrawal (i.e., withdrawal system) (e.g., Barrett & Russell, 1998; Carver, Sutton, & Scheier, 2000; Lang, Bradley, & Cuthbert, 1990; Rosenberg, 1998; Watson & Tellegen, 1985). Simply stated, approach system prompts approach behaviors (e.g., looking for food and mating partners), whereas withdrawal activation system stimulates withdrawal behaviors (e.g., escaping from danger). Because pleasant and unpleasant emotions in general are associated with approach and withdrawal behaviors, respectively (e.g., Fischer, Shaver, & Carnochan, 1990), it has been also proposed that two different types of activation system are uniquely intertwined with the valence of emotion (e.g., Lang et al., 1990; Watson et al., 1999). In other words, when approach system is activated motivating approach behaviors, pleasant emotion is exclusively accompanied, whereas unpleasant emotion is accompanied by the activation of withdrawal system.

However, the exclusive associations of pleasant emotion with approach on the one hand, and unpleasant emotion with withdrawal on the other hand have been challenged (e.g., Carver, 2001, 2003; Harmon-Jones, 2003; Roseman, 1991). Anger, sadness, and frustration, classic unpleasant emotions, have been found to be associated with approach motivation in some instances (e.g., Carver, 2004; Harmon-Jones, 2003; Roseman et al., 1990). In addition, anger often facilitates approach-oriented behavioral patterns (Crossman, Sullivan, Hitchcock, & Lewis, 2009) as well as increased left frontal cortex activity (Harmon-Jones, Abramson, Sigelman, Bohlig, Hogan, & Harmon-Jones, 2002; Harmon-Jones & Allen, 1998; Harmon-Jones & Sigelman, 2001; Harmon-Jones, Vaughn-Scott, Mohr, Sigelman, & Harmon-Jones, 2004). These data suggest that anger, an unpleasant emotion, is frequently associated with approach, not withdrawal, motivation. A plausible explanation of the link between anger and approach motivation is that anger is often provoked by goal blockage that might best be addressed through approach-oriented action. Levine (1995) reported that when encountering undesirable situations (e.g., goal attainment is impeded), children express anger when they believe they could reinstate the goals but sadness is expressed when reinstating the goals is perceived as impossible. In a similar vein, the link between anger and increased left frontal cortex activity is more discernible when individuals perceive that goal attainment is plausible (Harmon-Jones, Lueck, Fearn, & Harmon-Jones, 2006; Harmon-Jones, Sigelman, Bohlig, & Harmon-Jones, 2003), which seems to imply a positive linear relationship between a sense of controllability and the intensity of approach motivation (i.e., the more controllability, the stronger appetitive motivation) (Brehm & Self, 1989). It is worth noting that individuals perceive guilt-inducing situations as more controllable or modifiable (Frijda et al., 1989; Graham, 1988; Roseman et al., 1994) compared to shame-inducing ones. Therefore, it is conceivable that the intensity of approach motivation (e.g.,

making amends) would be greater with guilt than shame because of the greater sense of controllability with guilt.

In sum, valence and motivational direction should be understood as partially separable dimensions of emotional experience. Dissociation between valence and motivational direction seems more prominent among unpleasant emotions compared to pleasant emotions (e.g., Watson et al., 1999). That is one context that elicits unpleasant emotions may call forth approach motivation and action to change the situation, whereas another may call forth withdrawal motivation and action to escape the source of distress. Consistent with this view, guilt appears to be associated with approach motivation, whereas shame appears to be associated with withdrawal motivation.

The Current Study: Shame, Guilt, and Startle Reflex Modification

The startle probe is a tool that appears uniquely capable of evaluating the motivational underpinnings of shame and guilt. The startle reflex is facilitated when an organism is in withdrawal motivational state but inhibited when an organism is in approach motivational state (Lang et al., 1998). Thus, the startle paradigm permits evaluation of the motivational underpinnings of emotional states such as shame and guilt. Previous literature on this issue provides some evidence that shame and guilt could give rise to withdrawal and approach motives, respectively. However, this conclusion is largely based upon self-report data, which represents a critical limitation of the previous findings. Therefore, the current study aims to extend previous findings by exploring the effects of shame and guilt on startle reflex magnitude. The importance of utilization of multiple measures tapping into several domains (e.g., self-reported affective experience data, physiological data) comprising the "data of emotion" has been well documented (e.g., Lang, 1968, 1977 & 1979). Studies using shame and guilt measures

reflecting H. Lewis's theoretical framework (e.g., Test of Self-Conscious Affect; Tangney, Dearing, Wagner, & Gramzow, 2000) have repeatedly reported that shame but not guilt is positively associated with depressive symptoms, and the different motivational underpinnings of shame and guilt were hypothesized as a possible mechanism for these findings (see Kim et al., 2011 for a review). Therefore, the current study would offer an explanation of a heightened association of shame but not guilt with depressive symptoms. In addition, the current study would inform more effective ways of constructing messages to promote healthy behaviors; approach-associated guilt-inducing messages would be more effective to motivate individuals to engage in healthy behaviors.

To explore the differences in the magnitude of startle reflex between shame and guilt, imagery tasks were implemented in the current study. Participants imagined several scripts depicting different emotional antecedents as well as target emotion-relevant thoughts, behaviors, and feelings. Four different emotional states were manipulated: shame, guilt, neutral (i.e., pleasant and low arousal), and positive (i.e., pleasant and high arousal). While participants were engaged in the imagery task, eyeblink startle, HR and SC were collected online. Participants' self-reported affective experience of the scripts was assessed subsequent to physiological data collection. With respect to self-reported affective experience, it was expected that (a) shame and guilt would be appraised as inducing similar levels of unpleasantness and arousal; (b) shame-relevant momentary feelings would be stronger in the shame script condition than in the three other conditions; and (c) guilt-relevant momentary feelings would be stronger in the guilt script condition than in the three other conditions. With respect to startle reflex modification, it was hypothesized that (a) the magnitude of startle reflex would be largest while imagining the shame script followed by neutral, guilt, and positive scripts. Psychophysiological studies using imagery

tasks repeatedly report positive linear relationships of self-reported arousal with skin conductance and heart rate (e.g., Cook et al., 1988; McNeil, Vrana, Melamed, Cuthbert, & Lang, 1993; Miller et al., 2002; Patrick, Cuthbert, & Lang, 1994; Vrana, 1994; Vrana, Cuthbert, & Lang, 1989; Vrana & Lang, 1990; Witvliet & Vrana, 2000). Therefore, in terms of skin conductance and heart rate, it is expected that there would be no significant difference among shame, guilt, and positive scripts because they would be appraised as equally arousing. However, it was hypothesized that the magnitudes of heart rate and skin conductance under these emotional conditions would be larger than neutral script condition. Of note, documented similarities (e.g., unpleasant and arousing) between shame and guilt have been primarily base upon self-reported measures without incorporating physiological data (e.g., Frijda et al., 1989; Roseman et al., 1994). Inclusion of heart rate and skin conductance was thought to advance our understanding of the similar characteristics shared by shame and guilt.

Method

Participants

Seventy-four participants from a large northeastern university participated in the study in exchange for credit in an introductory psychology course. Participation of six participants was early terminated in the middle of the first of two imagery sessions due to self-reported fatigue. Consequently, sixty-eight participants (37 female, 40 White, mean age = 19.87, SD = 5.11) completed the whole experimental tasks.

Physiological data from 17 participants were excluded because of instrumentation problems; data were either not properly saved (n = 6) or contaminated with excessive noise (n = 11). Therefore, physiological data analyses are based on n = 51 participants. Participants excluded did not differ from their counterparts with respect to age, $t(66) = -1.45$, $p = .15$, gender,

$\chi^2(1, n = 68) = 2.39, p = .12$, or ethnicity $\chi^2(4, n = 68) = 1.92, p = .75$.

Stimulus Materials

Twelve sentence-length scripts that described three situations for each emotion condition (i.e., shame, guilt, neutral, and positive) were used as the emotional stimuli (see Appendix A).

First, construction of the emotional stimuli for shame and guilt were partly informed by another independent study conducted in our laboratory. For this study, 199 college students completed the Test of Self-Conscious Affect-3 (TOSCA-3; Tangney et al., 2000) (see Appendix B). The TOSCA measures cognitive, affective, and behavioral aspects of shame, guilt, and three other constructs (e.g., externalization of blame). The constructs of shame and guilt were largely adopted from Lewis's (1971) conceptualization of shame as reflecting negative aspects of self (e.g., being worthless, powerless) and guilt reflecting concerns about specific actions (e.g., feeling regret, wanting to repair). The TOSCA consists of 16 hypothetical situations (11 negative and 5 positive scenarios) (e.g., "You make plans to meet a friend for lunch. At 5 o'clock, you realize you stood your friend up") which were drawn from written accounts of personal shame, guilt, and pride experiences provided by several hundred college students and noncollege adults. Each scenario is followed by separate response choices reflecting shame (e.g., "You would think: "I'm inconsiderate""), guilt (e.g., "You'd think you should make it up to your friend as soon as possible"), and other constructs. Cronbach's alpha for shame and guilt were 0.76 and 0.66, respectively (Luyten, Fontaine, & Corveleyn, 2002). The TOSCA tends to yield somewhat low Cronbach's alpha because each item introduces additional variance associated with its own scenario (i.e., scenario approach introduces the situation variance) (Tangney & Dearing, 2002). In addition, guilt items on the TOSCA reflect concerns about specific actions, which may be an additional source of heterogeneity among these items, whereas shame items on the TOSCA

reflect more stable self-perception. That is, use of more contextually bound information for the guilt items may be one reason for the lower Cronbach's alphas observed for guilt items than for shame items, which have more of a general self-perception basis.

Table 1 reported descriptive statistics of shame and guilt scores of TOSCA for each of the 11 negative scenarios. Shame and guilt are often experienced simultaneously in the same situation (Gilbert & Miles, 2000; Harder & Zalma, 1990; Higgins, 1987). Scenarios were rank-ordered based upon shame and guilt score, respectively. To minimize a chance of "emotional blending," situations that were highly ranked for both shame and guilt (e.g., scenario1) were excluded from the final pool of emotional stimuli. Scenario 15 and 4 were selected as shame scripts; they were ranked as second and third on shame score but these scenarios were ranked relatively lower on guilt score. Scenario 7, 10 and 13 were selected as guilt scripts based upon the same rationale. Selected scripts (i.e., two for shame, three for guilt; succeeding section described a development of third shame script) for the current study were slightly modified from the original format of the TOSCA (e.g., "At work, you wait until the last minute to plan a project, and it turns out badly. You would feel incompetent." was changed to "One of my classes requires a 10-page essay that is a really high-stakes paper. It turns out really badly, and I feel like I am stupid and incompetent.") (see Appendix A). To maximize participants' experiencing "pure" target emotions, each emotional script illustrated both a hypothetical situation and shame- or guilt-relevant response.

The constructs of shame measured by the TOSCA seem to less clearly tap into Gilbert's evolutionary perspective in which shame results from the awareness of defeat or lowered social status. Gilbert (1997) proposed that human beings have innate needs to be seen as attractive to others, and social status is largely determined by this social attractiveness. By being less

attractive, an individual may take a lower social position and become more vulnerable to shame. Since physical appearance could play an important role to determine social attractiveness, negative evaluations about one's body made by either the self or others provoke feelings of shame (Fredrickson & Roberts, 1997; Fredrickson, Roberts, Noll, Quinn, & Twenge, 1998; McKinley & Hyde, 1996; Noll & Fredrickson, 1998; Slater & Tiggemann, 2002; Tiggemann & Slater, 2001). Consequently, the third shame script was created by the experimenter to reflect this evolutionary framework. Of importance, receiving social rejection or disapproval has been conceptualized as shame-relevant and, consequently, is integrated in this script (cf. Higgins, 1987; Lewis, 1971).

The stimuli for neutral and positive emotional conditions were obtained from previous research on emotional imagery (e.g., Cook et al., 1988; Miller, Levin, Kozak, Cook, McLean, & Lang, 1987; Witvliet & Vrana, 1995, 2000). Witvliet and Vrana (1995) described that a sample of 55 undergraduates rated 70 affective sentences using 7-point Likert-type scales in terms of valence, arousal, dominance, and a few discrete emotional states (e.g., joy, pleasant relaxation). Witvliet and Vrana reported that affective sentences for joy and pleasant relaxation (i.e., neutral) were selected based upon participants' endorsement of pleasantness, arousal, and representativeness of the specific emotion category. Joy sentences were appraised as positive and highly arousing, whereas pleasant relaxation as positive and less arousing. Other researchers (e.g., Cook et al., 1988) reported almost identical affective ratings for the same neutral scripts. Of note, scripts depicting pleasant relaxation were labeled as neutral scripts in previous imagery studies (e.g., Cook et al., 1988; Miller et al., 1987).

Design

In the current study, participants imagined a pair of emotional scripts that they were cued

to imagine for 8 seconds by letter presentation (either ‘A’ or ‘B’) (as described in detail in the Procedure section later). Similar procedures were implemented by previous startle modification studies using imagery (e.g., Witvliet & Vrana, 1995, 2000). Eight-second imagery trial was terminated when the word ‘relaxation’ appeared on the computer screen, when participants returned to relaxation. The duration of relaxation period was between 24 – 40 seconds. Each pair of scripts consisted of two different emotional conditions, and therefore six pairings were made total (i.e., shame-guilt, shame-neutral, shame-positive, guilt-neutral, guilt-positive, neutral-positive). Participants imagined each script four times in one block, and therefore eight imagery trials consisted of one block. Six such blocks occurred in each experiment session, where participants imagined all twelve different emotional scripts. Within each block, the startle probes (i.e., a 50-ms burst of 95 dB white noise) were presented in the latter imagery trials (i.e., equally often at 5, 6, or 7 seconds following imagery cue onset) in three out of the four trials of each emotional condition. Two startle probes were presented within the relaxation periods to increase the participants’ unpredictability of the occurrence of the startle stimuli. Participants were instructed to ignore these noises.

Apparatus and Physiological Response Measurement

Stimulus control and data acquisition were accomplished using a Dell OptiPlex GX1 computer running LabVIEW vi. software (National Instruments Corporation, Austin, TX). The startle stimulus was a 50-ms burst of 95 dB white noise with instantaneous rise time presented binaurally through Telephonics TDH-50 headphones.

Electromyographic (EMG) recording. The startle response is often measured via the eyeblink reflex in human startle research, and facial EMG is a generally preferred method to assess eyeblink reflex. The current study followed the guidelines (e.g., skin preparation, startle

elicitation) for EMG study offered by Blumenthal, Cuthbert, Filion, Hackley, Lipp, and Boxtel (2005). Activity in the orbicularis oculi facial muscles was recorded using 4-mm Ag/AgCl electrodes (Coulbourn Instruments, Allentown, PA) filled with electrolyte gel. One electrode was placed below the lower left eyelid in the line with the pupil in forward gaze, and a second electrode was placed approximately 1-2 cm lateral to the first one. Raw EMG signals were amplified with separate Coulbourn V75-04 isolated bioamplifiers; frequencies below 90 Hz and above 1000 Hz were filtered. The EMG analogue output was digitized by a PMD-16608FS A/D Converter. All signals were sampled at 1000 Hz and integrated offline by the LabView software.

Skin conductance. Skin conductance measures were gathered by a Coulbourn V71-23 isolated skin conductance coupler using a constant voltage of 0.5 V. The coupler was calibrated prior to each experimental session to detect activity in 0–40 μS range. Two standard 8-mm Ag/AgCl electrodes filled with 0.05-m NaCl Unibase paste were placed on the hypothenar eminence of the nondominant hand. The skin conductance was sampled at 10 Hz with a 12-bit analog-digital converter.

Electrocardiogram (ECG). Heart rate activity was recorded from standard 8-mm Ag/AgCl electrodes filled with electrolyte gel and positioned on the left and right inner forearms. The ECG signal was acquired by a Coulbourn V75-11 isolated ECG amplifier/coupler. The signal was filtered with high and low filter settings of 8 and 40 Hz. The ECG output was routed to a PMD-16608FS analog-to-digital converter and a custom built R-wave detector, with a digital pulse output whose leading edge (0 to 5 V transition), corresponded to the R-wave peak in the ECG waveform. At 2000 samples/second, the digitized output of the R-wave detector maintained a 1-millisecond time resolution, which served as a trigger to measure interbeat intervals to the nearest millisecond.

Procedure

Upon arrival to the laboratory, participants first provided informed consent. They then were seated in a chair facing a 17-inch computer screen (2.5 feet away). Upon completion of electrode application, a brief description of the purpose of the study was provided. They were told that the purpose of the study was to explore various people's reactions to social situations encountered in life. Then, the experimenter presented to participants a pair of two index cards with typed scripts illustrating different emotional situations. Additional index cards with letter either 'A' or 'B' covered the script cards. Participants were instructed to read each script and create vivid imagery of the event described. Once participants reported having created vivid imagery for each script, they were instructed to imagine the situation in one of the scripts every time the letter 'A' presented on the computer screen, and to imagine the situation of the other script every time the letter 'B' presented on the screen. In addition, they were instructed to relax and think the word 'one' with each exhalation when the word 'relaxation' was shown on the screen. The same relaxation instruction was used in the previous imagery studies and shown to reduce tonic physiological reactivity (e.g., Cuthbert, Kristeller, Simons, Hodes, & Lang, 1981; Vrana, 1994). They were also told that a burst of white noise would be occasionally delivered over the headphones throughout imagery session. They were instructed to ignore these noises. Then, the experimenter summarized the main points of the instructions, dimmed the lights, and exited the room.

Upon the completion of the first imagery block, the experimenter returned with the next pair of scripts of the two emotional conditions not imagined in block 1, and the same procedure described above was implemented. This procedure was repeated for a total of six blocks. Six orders of emotion pairings across experiment blocks were used (see Table 2). In addition, the

same order of emotion pairings used for the preceding participant was used for a following participant with reversed letter pairing so that each type of script was imagined with letter ‘A’ and ‘B’ equally often. The order of scripts representing each emotional condition was randomized within participants. Upon completion of all imagery sessions, participants completed a brief post-experimental questionnaire (see Appendix C) which served as a manipulation check. Participants indicated that they carefully followed the imagery (mean = 7.53, SD = 1.04) and relaxation (mean = 6.97, SD = 1.61) instructions given in the study. Participants reported that following imagery instruction (mean = 5.27, SD = 2.06) and vividly imaging the situations (mean = 5.22, SD = 2.12) were both moderate in difficulty. Similarly, following relaxation instruction (mean = 4.42, SD = 2.26) and relaxing during relaxation period (mean = 4.53, SD = 2.18) were of moderate in difficulty.

Upon completion of the manipulation check, physiological recording sensors were removed. The experimenter then informed the participant that they would imagine scripts for a second time for purposes of self-report emotion ratings. Twelve scripts were randomized within participants and PowerPoint slide shows were used for this second imagery session. Following 24-second relaxation period, a written script was displayed for 4 seconds and a blank slide was then displayed for 8 seconds during which participants were instructed to imagine the script. Participants then completed pencil-and-paper questionnaires to rate their imagery experience of the script on affective dimensions of pleasantness and arousal in addition to the vividness of each imagery scene (see Appendix D). They also completed the Personal Feelings Questionnaire-2 (PFQ-2; Harder & Zalma, 1990) (see Appendix E) to report their momentary shame- and guilt-relevant feelings for each emotional script. The PFQ is an adjective checklist assessing shame with 10 items (e.g., embarrassment, feeling ridiculous, feelings of blushing) and guilt with 6

items (e.g., worry about hurting or injuring someone, intense guilt, regret). Cronbach's alpha for shame and guilt were 0.78 and 0.72, respectively (Harder & Zalma, 1990). Since the PFQ taps into trait-shame and guilt, the question format was modified from "how common the feeling is for you" to "how much of each emotion you felt while imagining the script" to assess participants' affective experience during the imagery trials. Participants responded on a 5-point scale ranging from 'never' (0) to 'very strongly' (4). The order of these questionnaires was counterbalanced across imagery trials. This procedure was repeated for a total of twelve scripts. In the current study, Cronbach's alphas of the PFQ-Shame subscale ranged from .89 to .53 (average Cronbach's alpha = .81); Cronbach's alphas ofthe PFQ-Guilt subscale ranged from .89 to .04 (average Cronbach's alpha = .73). PFQ scores with unsatisfactory Cronbach's alpha ($\alpha <$ .70) (i.e., shame score of Neutral 1 script, guilt scores of Neutral 3 and Positive 3 scripts) were treated as missing data in the data analysis. These inconsistent alphas suggest that this revised PFQ might have not appropriately assessed momentary shame and guilt feelings in the lab context. In addition, the inconsistent within-subscale response was deemed to contribute to the low Cronbach's alphas obtained in the current study. For example, a close inspection of participants' responses on PFQ guilt items revealed that they only endorsed the item "mild guilt" without endorsing other guilt items after they imagined Neutral 3 and Positive 3 scripts.

Upon completion of the second imagery session, participants completed the Center for Epidemiological Studies – Depression scale (CES-D; Radloff, 1977; see Appendix F), Test of Self-Conscious Affect-3 (TOSCA-3; Tangney et al., 2000; see Appendix B) and Behavioral Inhibition System (BIS) and Behavioral Activation System (BAS) Scales (BIS/BAS; Carver & White, 1994; see Appendix G). The CES-D is a 20-item self-report inventory designed to measure depressive symptomatology in the general population. Respondents rated how often

they had experienced depression-related symptoms within the past week using a 4-point scale. The BIS/BAS scales consist of 20 items (7 items for BIS and 13 items for BAS) measuring individuals' sensitivity to either cues of threat/punishment or cues of reward. Higher scores on BIS indicate that responses of inhibition or avoidance are highly activated by the cues of threat, whereas higher scores on BAS indicate that approach behavior is activated by the cues of reward. Participants responded to each item based on a 4-point scale (from 1, disagree strongly to 4, agree strongly). These supplementary questionnaires were included for exploratory data analysis to: 1) replicate findings of previous empirical studies reporting significant positive correlations between TOSCA shame and depressive symptoms, 2) investigate proposed withdrawal-related shame and approach-related guilt using self-report measures (i.e., positive correlation between TOSCA shame and BIS and between TOSCA guilt and BAS), and 3) investigate interaction effects between script conditions and these measures of individual differences. Participants were then debriefed and thanked for their participation in the study (see Appendix H for the experimental instruction and Appendix I for the debriefing statement). There were no significant group differences (n = 51 vs. n = 17 who were excluded from physiological data analysis) in these self-report measures; CES-D, $t(66) = -.02$, $p = .98$; BIS, $t(66) = -.21$, $p = .84$; BAS, $t(66) = 1.58$, $p = .12$; TOSCA-Shame, $t(66) = -1.27$, $p = .21$; TOSCA-Guilt, $t(66) = -.95$, $p = .35$.

Physiological Data Reduction

Quantification of the startle blink EMG response followed the guidelines offered by Bluementhal and his associates (2005). First, EMG data were edited for noise such as excessive movement, with contaminated trials being rejected from analysis. Being blind to the emotional condition with which blinks were associated, the author and a second rater independently screened these rejected imagery trials. Out of total 1836 trials (51 x 36), inter-raters' agreement

(i.e., whether or not to reject a trial) rate was 94%, and all disagreements were discussed and resolved by consensus. Consequently, 262 trials were rejected from 1836 trials (i.e., 14% rejection rate). Of note, due to some equipment errors, the startle blink measures were not recorded in 110 out of 262 trials, which were also counted as rejected trials. Adjusted rejection rate was then about 9% (162 out of 1736), which was comparable to another independent eyeblink startle study conducted in our laboratory (Thibodeau, 2009).

For each scorable imagery trial, the EMG baseline period was defined as the 50 ms immediately prior to delivery of the white noise probe. The peak EMG amplitude was determined in a window ranging from 20 ms to 200 ms after delivery of the white noise probe. Data reduction was executed by TrialViewer3 software (SenSyr, 2010). Startle response amplitude was computed by subtracting the EMG value at baseline from the peak. Startle magnitude, a dependent measure of data analysis, was expressed as the ratio of the response amplitude to EMG baseline value.

Skin conductance response (SCR) was computed by subtracting the average SC in a window of 1 second immediately prior to the imagery cue (i.e., letter A or B) onset from the peak in a window of 5 seconds following imagery cue onset. A log transformation (log [SCR + 1]) was used to normalize the data, following standard procedures. Heart rate (HR) change was computed by subtracting the average HR in the 1 second prior to the imagery cue onset from the average HR during 8 seconds of imagery trial. SCR and HR data reduction was also executed by TrialViewer3 software (Sensyr, 2010). Due to some equipment errors, SCR and HR measures were not recorded in 329 and 110 out of total 2448 trials (48 x 51), respectively. Trials without physiological data were treated as missing data.

Data Analysis

The dependent measures included physiological reactivity (i.e., startle magnitude, HR and SCR), PFQ shame and guilt, and imagery ratings (i.e., valence, arousal, and vividness). The experimental design of the current study produced repeated measures data. For example, 36 repeated measures were made for startle magnitude within an individual. These repeated measures data are hierarchical (or nested). In other words, measurement occasions are nested within individuals. For the current study, 9 repeated measures were nested within a script category, and therefore 36 repeated measures of startle magnitude were nested within an individual. The same logic was applied to other repeated measures in the current study. For repeated measures data analysis, advantages of multi-level modeling (MLM) over conventional analytic methods such as ANOVA or MANOVA are well documented (e.g., Quene & Bergh, 2004); one such advantage of MLM is that it is capable of statistical analysis of incomplete or unbalanced data (i.e., dataset with missing data (Snijders & Bosker, 1999). In psychophysiological research often utilizing repeated measures designs, MLM has been recently discussed as an alternative data analysis approach (e.g., Kristjansson, Kircher, & Webb, 2007).

In order to evaluate the effects of emotional conditions on startle magnitude, planned contrasts were performed: a) shame vs. neutral (1, -1, 0, 0), b) neutral vs. guilt (0, 1, -1, 0), and c) guilt vs. positive (0, 0, 1, -1). One contrast was used to test a hypothesis about differences in heart rate and skin conductance among emotional conditions: shame, guilt, and positive vs. neutral (1/3, -1, 1/3, 1/3). In order to evaluate the effects of emotional conditions on affective experience, two contrasts were used: a) shame (shame vs. guilt, neutral, and positive) (1, -1/3, -1/3, -1/3) and b) guilt (guilt vs. shame, neutral, and positive) (-1/3, -1/3, 1, -1/3). In order to examine the effects of emotional conditions on valence and arousal, two contrasts were used: a) valence (shame and guilt vs. neutral and positive) (-1, 1, -1, 1) and b) arousal (shame, guilt, and

positive vs. neutral) (1/3, -1, 1/3, 1/3). All statistical tests used an alpha level of .05 for statistical significance. In order to examine the effects of emotional conditions on vividness of imagery, the Bonferroni correction was used to control family-wise error rate when contrasting the mean value across emotional conditions.

Statistical analysis was performed using SPSS (v. 20, SPSS Inc, Chicago, IL). Mixed Models - Linear of SPSS was used for MLM. Full maximum likelihood method was used to estimate missing data. Repeated measures nested within an individual are correlated with each other. To address these dependent errors among repeated measures of physiological data (i.e., startle response, heart rate, and skin conductance), an autoregressive covariance structure was used. Psychophysiological research with repeated measures of startle magnitude, heart rate and skin conductance has reported the habituation effect (i.e., magnitude of physiological reactivity tends to decrease over trials) (e.g., Bradley, Lang, & Cuthbert, 1993). Pearson correlation coefficients of the current study replicated the habituation effect; correlation coefficients among trial and three physiological measures ranged from r (1574) = -0.083 to r (2119) = -0.168, and they were statistically significant at alpha level of .01. That is, two measurements right next to each other tend to show a higher correlation compared to two measurements farther apart from each other. For repeated measures of self-report data (i.e., valence, arousal, vividness, shame and guilt) obtained from second imagery task, unstructured covariance structure was used. Scripts were randomly ordered for each participant so that no systemic relationship (e.g., correlation) was deemed to be observed among measure of each variable. Pearson correlation coefficients between trials and these variables largely confirmed this prediction in that no significant correlation was found between trials and the variables, except vividness (r (790) = 0.098, $p <$ .01). For valence and guilt, convergence was not achieved with unstructured covariance

structure, and therefore autoregressive covariance structure was used instead. Results remained the same with compound symmetry covariance structure.

Results

Physiological Reactivity Data

Startle response magnitude (SRM). MLM results examining the effect of script conditions on SRM are shown in Table 3. A preplanned contrast (1, -1, 0, 0) examining any significant difference in SRM between shame and neutral script conditions confirmed that startles elicited during shame scripts were significantly larger than ones elicited during neutral scripts, t (154.988) = 4.469, $p < .001$. Another preplanned contrast (0, 1, -1, 0) examining difference between neutral and guilt script conditions revealed that startles elicited during guilt scripts were significantly larger than ones elicited during neutral scripts, t (152.544) = -3.413, $p < .01$, which was contrary to the prediction. The last contrast (0, 0, 1, -1) examining difference between guilt and positive script conditions supported the prediction that startles elicited during guilt scripts was significantly larger than ones elicited during positive scripts, t (150.233) = 3.750, $p < .01$. There was no significant difference in SRM between shame and guilt script conditions, t (139.570) = 1.134, $p = .259$. SRM difference between neutral and positive script conditions was not statistically significant, t (154.674) = 0.364, $p = .716$.

Heart rate change (HRC). MLM results examining the effect of script conditions on HRC are shown in Table 4.A preplanned contrast (1/3, -1, 1/3, 1/3) revealed that HRC of shame, guilt and positive script conditions was significantly larger than neutral script condition's, t (142.773) = 5.415, $p < .001$. Post-hoc comparison revealed that there was no significant difference in HRC among shame, guilt and positive script conditions.

Skin conductance response (SCR). MLM results examining the effect of script conditions on SCR are shown in Table 5. A preplanned contrast (1/3, -1, 1/3, 1/3) revealed that SCR of shame, guilt and positive script conditions was significantly larger than neutral script condition's, t (158.064) = 4.299, $p < .001$. Post-hoc comparison revealed that there was no significant difference in SCR among shame, guilt and positive script conditions.

Self-Report Data

Data obtained from the second imagery task. MLM results examining the effect of script conditions on valence are shown in Table 6. A preplanned contrast (1, -1, 1, -1) revealed that both neutral and positive scripts were rated as more pleasant as compared to shame and guilt scripts, t (278.628) = - 63.999, $p < .001$. Another preplanned contrast (1, 0, -1, 0) revealed that shame script was rated as more unpleasant than guilt script, t (282.072) = -2.485, $p = .014$. Valence rating between neutral and positive script conditions was not statistically significant, t (274.238) = -0.017, $p = 0.987$. For arousal (see Table 7), a preplanned contrast (1/3, -1, 1/3, 1/3) supported the hypothesis that the neutral script was rated less arousing compared to the three other script conditions, t (152.711) = 11.124 $p < .001$. No significant difference between shame and guilt script conditions emerged, t (154.170) = 0.709, $p = 0.479$. Post-hoc comparisons with Bonferroni correction revealed that positive script was rated more arousing than guilt script condition, t (158.016) = -2.919, $p = 0.02$. No significant difference between shame and positive script conditions was obtained, t (155.318) = -2.206, $p = .173$. For vividness (see Table 8), univariate test indicated that there were significant differences in vividness ratings among 4 script conditions, F (3, 134.038) = 17.254, $p < .001$. Post-hoc comparisons with Bonferroni correction indicated that neutral scripts were rated more vivid than shame, t (126.781) = -6.214, $p < .001$, and guilt, t (140.810) = -5.705, $p < .001$, scripts and that positive script was also rated

more vivid than shame, t (135.304) = -3.617, p = 0.003, and guilt, t (130.598) = -3.132, p = 0.013, scripts. Significant differences were not obtained for either the shame and guilt script comparison or the neutral and positive script comparison. The main effect of script condition on SRM remained the same (i.e., shame, guilt > neutral, positive) even after covarying out the vividness of scripts.

For shame (see Table 9), a preplanned contrast (1, -1/3, -1/3, -1/3) supported the hypothesis that participants reported more intense shame feeling in the shame script condition as compared to other three script conditions, t (125.409) = 13.534, $p < .001$. Post-hoc comparison indicated that guilt script condition produced more intense shame feeling as compared to neutral, t (154.850) = 12.602, $p < .001$, and positive, t (113.902) = 6.794, $p < .001$, script conditions. Interestingly, self-reported shame feeling was more intense in the positive script condition than neutral script condition, t (133.262) = -6.217, $p < .001$. For guilt (see Table 10), a preplanned contrast (-1/3, -1/3, 1, -1/3) found that participants reported more intense guilt feeling in the guilt script condition as compared to other three script conditions, t (190.436) = 17.755, $p < .001$. Post-hoc comparison indicated that shame script condition produced more intense guilt feeling as compared to neutral, t (233.925) = 15.519, $p < .001$, and positive, t (239.986) = 14.612, $p < .001$, script conditions.

Paper-and-pencil questionnaires data. Descriptive statistics and bivariate correlation coefficients for all variables obtained from paper-and-pencil questionnaires (i.e., CES-D, BAS, BIS, TOSCA-Shame, TOSCA-Guilt) are presented in Table 11. Largely replicating findings of previous studies (e.g., Johnson, Turner, & Iwata, 2003; Kasch, Rottenberg, Arnow, & Gotlib, 2002; Tangney et al., 1992), BIS was significantly and positively correlated with CES-D, and there was a significant positive correlation between shame and guilt of TOSCA. In addition,

shame of TOSCA was significantly and positively correlated with CES-D. Of note, shame of TOSCA was significantly and positively correlated with BIS ($r = 0.53$, $p < .01$). However, no significant correlation between guilt of TOSCA and BAS emerged ($r = 0.02$, $p > .05$).

Supplementary Data Analysis: Explaining Variance in Physiological Data with Self-Reported Data

Primary research hypotheses of the current study were to investigate the main effect of script conditions on startle response magnitude (SRM). Data analysis results partially supported the hypotheses in that SRM of shame script condition was larger than neutral script's and that SRM of guilt script condition was larger than positive script's. However, data analysis results revealed no significant differences in SRM between shame and guilt script conditions and between neutral and positive script conditions. Moreover, contrary to prediction, SRM of guilt script condition was larger than neutral script's. With respect to SRM, shame and guilt appeared to cluster in one category with neutral and positive in another category. Moreover, with respect to self-reported valence and guilt of second imagery session, shame and guilt appeared to cluster in one category (i.e., unpleasant and intense guilt-provoking) with neutral and positive in another category (i.e., pleasant and moderate guilt-provoking). Thus, additional MLM was conducted to investigate whether valence and guilt significantly explained the variance of SRM (see Table 12). Results showed that valence (t (1083.256) = -2.358, $p < .05$) and guilt (t (1043.800) = 2.254, $p < .05$) were statistically significant predictors of SRM. A script rated as more pleasant produced smaller SRM, whereas a script rated as more guilt-inducing produced larger SRM. None of between-individual variables (i.e., CES-D, BAS, BIS, TOSCA-Shame, TOSCA-Guilt) was a statistically significant predictor of SRM (see Table 13). No significant interaction effect between script condition and these between-individual variables emerged.

Discussion

Valence and arousal have been discussed as informative dimensions of emotion (e.g., Russell, 1979; Schlosberg, 1954). Affective science has confirmed that shame and guilt share the similarities in terms of valence and arousal in that shame and guilt are perceived as unpleasant and arousing emotions (e.g., Frijda et al., 1989; Roseman et al., 1994). These similarities were replicated in the current study as well in that both shame and guilt emotional scripts were rated as unpleasant and arousing. However, shame script was rated as more unpleasant than guilt. In addition, physiological indices (i.e., cardiovascular reactivity and skin conductance response) corresponding to arousal level also supported the similar characteristic shared by shame and guilt in that no significant differences emerged in heart rate change and skin conductance response between shame and guilt script conditions.

Despite these similarities, discrete aspects of shame and guilt have been explored, largely inspired by Lewis's theoretical framework and Gilbert's evolutionary biopsychology. Among others, discrete motivational directions (i.e., withdrawal-related shame vs. approach-related guilt) were informed by the above theoretical frameworks as well as supportive empirical studies (Linsday-Hartz, 1984; Tangney et al., 1996; Wicker et al., 1983). However, a noteworthy limitation of existing empirical research exploring the discrete aspects of shame and guilt is that self-report data have been a primary source of investigation. To address this limitation, the current study incorporated a number of physiological measures in addition to self-report data to investigate the motivational underpinnings of shame and guilt. Informed by Lang's startle reflex paradigm (see Lang, 1995 for a review), the current study examined whether startle response magnitude can differentiate shame from guilt. For this purpose, participants engaged in imagery tasks in which they imagined emotionally laden scripts. It was hypothesized that startle response

magnitude would be larger while participants were imagining shame-activating scripts as compared to guilt-activating ones.

Startle reflex data in the current study supported a proposition that withdrawal-related shame is associated with potentiated startle response magnitude. More specifically, the startle magnitude of the shame script condition was significantly larger than the startle magnitude of neutral and positive script conditions. However, the startle magnitude response data did not support the hypothesis that the shame script condition would produce a larger startle response magnitude than the guilt script condition. Even though self-report data indicated that the shame and guilt scripts elicited the intended emotions, startle response magnitude was not significantly different between shame and guilt script conditions. In addition, contrary to prediction, startle response magnitude in the guilt script condition was significantly larger than in the neutral script condition. Furthermore, no significant startle response magnitude difference emerged between neutral and positive script conditions. Therefore, startle response magnitude data suggested that four different emotional script conditions might be organized into two categories: shame and guilt as one and neutral and positive as the other.

The finding that there was no significant difference in startle response magnitude between shame and guilt might be because of "emotional blending" of shame and guilt in both shame and guilt script conditions. An inspection on affective ratings revealed that shame scripts successfully induced a target feeling (i.e., shame) in that, as hypothesized, participants reported more intense shame feelings in the shame script condition as compared to the other three script conditions. Likewise, participants reported more intense guilt feelings in the guilt script condition as compared to the other three script conditions. However, it also was observed that participants reported relatively intense guilt feeling in the shame script and shame feelings in the

guilt script. These findings suggest that the simultaneous experience of both shame and guilt (i.e., high degree of "blending") may explain the lack of a significant difference found between startle response magnitudes for the two script conditions. In other words, the effect of withdrawal-related shame on startle reflex potentiation might have been countervailed by participants simultaneously experiencing approach-related guilt; whereas the effect of approach-related guilt on startle reflex attenuation might have been countervailed by participants simultaneously experiencing withdrawal-related shame. In contrast, neutral and positive scripts could have activated approach-related pleasant feelings for which startle response magnitudes of these scripts conditions were significantly smaller than ones obtained from both shame and guilt conditions.

It can be further speculated that compared to neutral and positive scripts, shame and guilt scripts used in the current study were inherently more difficult to imagine. Thus, participants might have focused their imagery on unpleasant antecedent feelings instead of action (i.e., approach or withdrawal). For example, in two out of three guilt scripts, reparation action (i.e., approach) was probably difficult to be successfully implemented even in mental imagery. The laboratory situation where participants were sitting still in a chair could have inhibited this approach motivational response. Of note, in the absence of activation of motivational direction, anger was not associated with increased left frontal cortical activity, an index of approach motivation (Harmon-Jones et al., 2003).

Upon incorporating self-report data obtained during the second imagery task into startle magnitude data, it became discernible that valence plays a key role in determining startle response magnitude. Valence data indicated that participants perceived shame and guilt scripts as highly unpleasant and neutral and positive scripts were equally pleasant. In addition, regressing

self-reported affective data onto startle response magnitude, it was found that valence predicted the startle magnitude in that the more pleasant a script was perceived, the smaller the startle response magnitude was. This finding that valence modulates startle magnitude is consistent with previous empirical studies (e.g., Bradley et al., 1993). The current study's result that startle response magnitude was not significantly different a) between shame and guilt script conditions and b) between neutral and positive script conditions could, then, be attributed to the fact that a) shame and guilt scripts were perceived as highly unpleasant, and b) neutral scripts of the current study were perceived as equally pleasant as positive scripts. Even though shame script was rated as more unpleasant than guilt script, this observed hedonic valence difference might not have been large enough to bring about any significant difference in startle response magnitude between shame and guilt script conditions.

Startle hypotheses proposed in the current study were primarily informed by the view that startle magnitude is an index of motivational direction. The stimuli (regardless of their valence) activating approach system are theorized to produce attenuated startle response, whereas stimuli activating withdrawal system are theorized to produce potentiated startle response (Lang, 1995). This posits that motivational direction, not hedonic valence of stimuli, is a key determinant of startle response magnitude. However, the majority of previous empirical studies appear to inadequately examine this proposition because hedonic valence was often confounded with motivational direction. A linear pattern of startle magnitude as a function of valence (i.e., unpleasant > neutral > pleasant) has been repeatedly reported (e.g., Bradley et al., 1993; Vrana et al., 1988; see Lang et al., 1990 for a review). This linear pattern has been presented as supporting evidence that startle reflex taps into motivational direction of stimuli. One underlying assumption, though, is that hedonic valence is a proxy for motivational direction. In view of

some evidence (see Lang, 1995 for a review) suggesting that startle reflex reflects approach versus avoidance motivation and that hedonic valence may be a marker of approach versus avoidance, hedonic valence of stimuli might be a key determinant for startle reflex. The finding of the current study that valence emerged as a significant predictor of startle response magnitude appeared to be consistent with this speculation. In addition, in the current study state guilt measured during the second imagery session was found to be a significant predictor of startle response magnitude. That is, a script rated as more intensely guilt-inducing produced larger startle response magnitude. The association of state guilt with potentiated startle response magnitude also could be understood in the same context; namely, guilt, as an unpleasant affective state, could induce a potentiated startle reflex. However, TOSCA-Guilt did not emerge as significant predictor of startle response magnitude in the current study. These findings could be understood by the fact that self-report data, behavioral data and physiological data are often not correlating with each other (Lang, 1977). "Under most conditions of affective stimulation, responding systems appear to be only loosely coupled." (Lang, Levin, Miller, & Kozak, 1983, p. 277).

In the current study, self-reported shame was not a significant predictor of startle response magnitude. One unanticipated result of the current study was that participants endorsed relatively high shame scores for positive scripts. Self-reported shame scores for positive scripts were significantly higher as compared to neutral scripts. A close investigation on participants' ratings of PFQ-2 revealed that participants endorsed several shame-related items such as "feelings of blushing" and "feeling laughable" after they imagined positive scripts. Participants' endorsement on these items could reflect arousing aspects of positive scripts. Self-reported shame scores would be associated with potentiated startle reflex in both shame and guilt script

conditions, whereas self-reported shame scores would be associated with attenuated startle reflex in the positive script condition. Consequently, the effect of self-reported shame score on startle response magnitude could have been countervailed, and this may be one reason why the self-report of shame did not emerge as a significant predictor of startle response magnitude in the current study.

The amygdala has been proposed as a key modulator of startle reflex (e.g., Angrilli et al., 1996; Hitchcock & Davis, 1991). It may be then speculated that the amygdala processes incoming stimuli largely based upon their hedonic valence resulting in potentiated startle reflex for unpleasant stimuli but attenuated startle reflex for pleasant stimuli. Motivational direction of stimuli might be determined by more complex/high functioning brain structures such as the prefrontal cortex, which could be detected by EEG measures. Interestingly, data obtained from pencil-and-paper questionnaires of the current study indicated a positive correlation between shame measured by TOSCA-3 and avoidance tendency measured by BIS. Even though no cause-and-effect relationship can be confirmed by this correlational data, the positive correlation between shame and avoidance tendency certainly warrants a further investigation about withdrawal-related shame. In addition to hedonic valence, items on the TOSCA-3 and BIS tap into cognitive processes and behavioral engagement, and these variables may be more subject to more complex/high functioning brain structures. Startle reflex, modulated by the amygdala, may not have sufficiently detected these processes, therefore, failing to differentiate shame from guilt. Regarding approach-related guilt, though, no significant positive correlation was found between guilt measured by TOSCA-3 and approach tendency measured by BAS. This suggests that shame could be differentiated from guilt in terms of magnitude of withdrawal motivation.

Consistent with psychophysiological research, cardiovascular reactivity and skin conductance successfully differentiated highly arousing stimuli from less arousing stimuli. As hypothesized, shame, guilt and positive scripts were rated more arousing than neutral script. Likewise, the former three scripts yielded larger heart rate change and skin conductance response as compared to neutral script. Furthermore, regressing self-reported data (i.e., valence, arousal, shame, guilt and vividness) on heart rate change and skin conductance response, arousal was a significant predictor for both variables. Scripts rated more arousing yielded larger heart rate and skin conductance. These findings are consistent with psychophysiological research reporting positive linear relationships of self-reported arousal with these two physiological variables (e.g., Cook et al., 1988; McNeil et al., 1993; Vrana & Lang, 1990). Additionally, a significant negative linear relationship between PFQ-2 guilt and heart rate change was found. This negative linear relationship indicates that scripts rated as less guilt-inducing yield larger heart rate change. Positive scripts elicited very little guilt and significant heart rate reactivity, and this pattern of findings could be underlying the overall relationship between guilt score and heart rate change among the four emotional script conditions.

Limitations and Future Directions

"Emotional blending" of shame and guilt observed in the current study was discussed as a plausible explanation for the nonsignificant difference in startle response magnitude between shame and guilt conditions. In fact, the tendency to simultaneously experience shame and guilt has been widely documented (e.g., Hooge et al., 2007). Shame and guilt scripts selections were informed by another independent study conducted in our laboratory. However, as Table 1 indicated, the majority of scenarios selected as either shame or guilt scripts for the current study are indeed deemed to elicit these two emotions simultaneously, which might have contributed to

"emotional blending." To address this issue and minimize the degree of "emotional blending," shame and guilt scripts used in the current study explicitly referenced shame- or guilt-relevant responses in reaction to hypothetical situations. However, this approach may have been unsatisfactory. Individualized/personalized emotional scripts instead of standardized ones may provide a more accurate/specific approach to minimize the degree of "emotional blending." Personalized emotional scripts can also better assist participants in more actively engaging in imagery tasks. To develop individualized scripts, a structured interview to elicit detailed information from participants about their own personal experience of shame and guilt is worth considering. In addition, between-groups design instead of within-group one of this study is worth considering as a means of minimizing "emotional blending." That is, with a between-groups design, participants are assigned to imagine only a guilt script or only a shame script within an imagery block to prevent carry-over effects.

A high degree of "blending" of shame and guilt observed in the current study's results from the PFQ-2 may relate to this measures construction. One disadvantage of PFQ-2 is that due to lack of clear understanding of differences between shame and guilt, respondents tend to endorse both guilt and shame adjectives to report either guilt or shame feelings (Tangney, 1996). For example, respondents are more likely to endorse a guilt item ("mild guilt") to reflect their shame experience. Guilt is often used as a generic term for both shame and guilt. Therefore, the use of the PFQ-2 can result in the high degree of "blending" of shame and guilt. Scales without the term "guilt" such as State Shame and Guilt Scale (SSGS) (Marschall, Sanftner, & Tangney, 1994) may help to decrease the "blending" of shame and guilt. SSGS does not include items such as "feelings of blushing" and "feeling laughable" that participants would be more likely to endorse to reflect highly arousing positive affect as observed in the current study. Even if a

future study finds that startle response magnitude in the shame condition is larger than in the guilt condition, a firm conclusion may not be drawn with the high degree of "blending" of shame and guilt obtained associated with self-report.

The findings of the current study invite more vigorous empirical studies examining the role of motivational direction on startle reflex modulation. As discussed above, valence instead of motivational direction might play a key role in startle magnitude modification. Valence has been confounded with motivational direction in a number of startle reflex studies (Bradley et al., 1993; Vrana et al., 1988), thereby clouding the interpretation of the degree to which startle reflex is modulated by motivational direction. Direct empirical tests addressing the confound effect of valence and motivational direction would help determine whether startle response modulation is subject to motivational direction or hedonic valence of stimuli. A direct manipulation of motivational direction without a hedonic valence confound is a necessary step to better determine whether startle reflex is modulated by motivational direction. To the author's knowledge, only one empirical study (i.e., Thibodeau, 2011) directly manipulated motivational direction without an hedonic valence confound in which arm extension deemed to activate withdrawal motivation elicited larger startle response than arm flexion deemed to activate approach motivation. These findings support the view that startle reflex is modulated by motivational direction independent of hedonic valence because a non-significant difference in hedonic valence emerged between the two arm positions.

Another simple strategy that could directly manipulate motivational direction independent of hedonic valence is hand contractions (Harmon-Jones, 2006). Contractions of the right hand are deemed to induce approach, whereas contractions of the left hand are deemed to activate withdrawal. If startle response magnitude is significantly different between these two

contractions conditions (i.e., contractions of the left hand > contractions of the right hand), this finding may offer supporting evidence that startle response is modulated as a function of motivational direction. In addition, future study would benefit from the inclusion of measures such as EEG tapping into more complicated/high functioning brain structures. The findings of startle reflex can be then compared to EEG data. This comparison can further clarify the mechanisms for the motivational basis of startle reflex.

Summary and conclusion

Consistent with hypotheses, startle response magnitude in the shame script condition was significantly larger than neutral and positive script conditions. However, there were no significant differences in startle magnitude between shame and guilt script conditions or between neutral and positive script conditions. Valence of script was emerged as a significant predictor of startle response magnitude such that more pleasant scripts produced smaller startle magnitude. With respect to startle response magnitude and valence of script, shame and guilt appeared to cluster in one category with neutral and positive in another category. This finding invites more scientifically rigorous investigation of whether startle response is modulated by motivation direction or hedonic valence of foreground stimuli.

Table 1

Descriptive Statistics of TOSCA-3 Negative Scenarios

		Shame		Guilt	
	Item	Mean	SD	Mean	SD
TOSCA-3 scenarios	1	4.03	1.00	4.70	0.55
	2	1.36	0.68	3.95	1.01
	4*	3.54	1.18	3.11	1.24
	5	2.15	1.09	4.06	0.96
	7**	1.88	1.08	4.82	0.55
	9	3.20	1.39	4.11	1.06
	10**	3.29	1.33	4.41	0.84
	12	2.15	1.17	3.50	1.17
	13**	3.15	1.33	4.25	0.79
	15*	3.74	1.27	4.31	0.93
	16	2.92	1.30	4.19	1.04

*: shame scripts selected for the current study

**: guilt scripts selected for the current study

Table 2

Six Orders of Emotional Pairing utilized in the current study

	Block 1	Block 2	Block 3	Block 4	Block 5	Block 6
1	SG	NP	SG	NP	SG	NP
2	SN	GP	SN	GP	SN	GP
3	SP	GN	SP	GN	SP	GN
4	GN	SP	GN	SP	GN	SP
5	GP	SN	GP	SN	GP	SN
6	NP	SG	NP	SG	NP	SG

Note. S = Shame, G = Guilt, N = Neutral, P = Positive

Table 3

Multilevel Models Testing the Effect of Script Emotion Condition on Startle Response Magnitude

	Startle response magnitude				
	Estimate	SE	*t*	95% CI	Wald *Z* (*p*)
Fixed effect					
Shame	12.484	1.298		9.883 - 15.085	
Neutral	10.582	1.301		7.976 - 13.189	
Guilt	12.017	1.299		9.414 - 14.620	
Positive	10.427	1.301		7.820 - 13.033	
Overall script condition difference	(*F* (3, 148.925) = 11.863***)				
Shame vs. Neutral	1.901	0.425	4.469***		
Guilt vs. Neutral	1.434	0.420	3.413**		
Guilt vs. Positive	1.590	0.424	3.750***		
Shame vs. Guilt	0.467	0.412	1.134		
Neutral vs. Positive	0.156	0.427	0.364		
Random effect					
Individual variance	80.494	16.375			4.916***

Note. $N = 51$.

** $p < .01$. *** $p < .001$.

Table 4

Multilevel Models Testing the Effect of Script Emotion Condition on Heart Rate Change

	Heart rate change				
	Estimate	SE	*t*	95% CI	Wald *Z* (*p*)
Fixed effect					
Shame	1.157	0.277		0.608 – 1.706	
Neutral	0.108	0.278		-0.444 – 0.660	
Guilt	1.237	0.279		0.685 – 1.790	
Positive	1.348	0.276		0.800 – 1.896	
Overall script condition difference	(*F* (3, 138.913) = 10.033***)				
Shame, Guilt, Positive vs. Neutral	1.140	0.210	5.415***		
Shame vs. Guilt[a]	-0.080	0.257	-0.313		
Shame vs. Positive[a]	-0.191	0.251	-0.761		
Guilt vs. Positive[a]	-0.110	0.257	-0.429		
Random effect					
Individual variance	1.916	0.532			3.599***

Note. $N = 51$. [a] Bonferroni correction was applied for significance test.

*** $p < .001$.

Table 5

Multilevel Models Testing the Effect of Script Emotion Condition on Skin Conductance Response

	Skin conductance response				
	Estimate	SE	*t*	95% CI	Wald *Z*
Fixed effect					
Shame	0.224	0.020		0.183 - 0.264	
Neutral	0.130	0.020		0.090 - 0.171	
Guilt	0.222	0.020		0.181 - 0.262	
Positive	0.235	0.020		0.195 - 0.276	
Overall script condition difference	(F (3, 157.470) = 6.355***)				
Shame, Guilt, Positive vs. Neutral	0.096	0.022	4.299***		
Shame vs. Guilt[a]	0.001	0.027	0.049		
Shame vs. Positive[a]	-0.017	0.027	-0.629		
Guilt vs. Positive[a]	-0.018	0.027	-0.675		
Random effect					
Individual variance	0.013	0.002			6.802***

Note. N = 48. [a] Bonferroni correction was applied for significance test.

*** $p < .001$.

Table 6

Multilevel Models Testing the Effect of Script Emotion Condition on Valence Rating

	Valence [a]				
	Estimate	SE	*t*	95% CI	Wald *Z* (*p*)
Fixed effect					
Shame	1.933	0.090		1.755, 2.111	
Neutral	7.899	0.089		7.723, 8.074	
Guilt	2.254	0.090		2.076, 2.432	
Positive	7.901	0.089		7.725, 8.076	
Overall script condition difference	(*F* (3, 278.235) = 1367.542***)				
Shame, Guilt vs. Neutral, Positive	-5.806	0.090	-63.999***		
Shame vs. Guilt	-0.321	0.129	-2.485*		
Neutral vs. Positive	-0.002	0.127	-0.017		
Random effect					
Individual variance	0.279	0.050			5.595***

Note. $N = 68$. [a] higher value corresponds to more pleasant.

* $p < .05$. *** $p < .001$

Table 7

Multilevel Models Testing the Effect of Script Emotion Condition on Arousal Rating

	Arousal[a]				
	Estimate	SE	*t*	95% CI	Wald *Z* (*p*)
Fixed effect					
Shame	6.053	0.178		5.702, 6.405	
Neutral	4.028	0.179		3.675, 4.382	
Guilt	5.884	0.178		5.532, 6.235	
Positive	6.579	0.177		6.230, 6.928	
Overall script condition difference	(*F* (3, 154.623) = 44.591***)				
Shame, Guilt, Positive vs. Neutral	2.144	0.193	11.124***		
Shame vs. Guilt	0.169	0.239	0.709		
Shame vs. Positive[b]	-0.526	0.238	-2.206		
Guilt vs. Positive[b]	-0.695	0.238	-2.919*		
Random effect					
Individual variance	1.155	0.224			5.165***

Note. $N = 67$. [a] Higher value corresponds to higher arousal. [b] Bonferroni correction was applied for significance test.

* $p < .05$. *** $p < .001$.

Table 8

Multilevel Models Testing the Effect of Script Emotion Condition on Vividness Rating

	Vividness[a]				
	Estimate	SE	*t*	95% CI	Wald *Z* (*p*)
Fixed effect					
Shame	7.048	0.110		6.831, 7.266	
Neutral	7.806	0.110		7.588, 8.024	
Guilt	7.110	0.112		6.890, 7.330	
Positive	7.492	0.110		7.276, 7.709	
Overall script condition difference	(*F* (3, 134.038) = 17.254***)				
Shame vs. Neutral[b]	-0.758	0.122	-6.214***		
Shame vs. Positive[b]	-0.444	0.123	-3.617**		
Guilt vs. Neutral[b]	-0.696	0.122	-5.705***		
Guilt vs. Positive[b]	-0.382	0.122	-3.132*		
Neutral vs. Positive[b]	0.314	0.120	2.615		
Shame vs. Guilt[b]	-0.062	0.127	-0.488		
Random effect					
Individual variance	0.129	0.071			1.816

Note. $N = 68$. [a] Higher value corresponds to higher vividness. [b] Bonferroni correction was applied for significance test.

* $p < .05$. ** $p < .01$. *** $p < .001$.

Table 9

Multilevel Models Testing the Effect of Script Emotion Condition on Shame Rating

	Shame[a]				
	Estimate	SE	*t*	95% CI	Wald *Z* (*p*)
Fixed effect					
Shame	16.393	0.764		14.881, 17.906	
Neutral	3.737	0.785		2.186, 5.289	
Guilt	13.166	0.768		11.646, 14.686	
Positive	8.318	0.766		6.803, 9.834	
Overall script condition difference	(*F* (3, 128.468) = 111.783***)				
Shame vs. Guilt, Neutral, Positive	7.986	0.590	13.534***		
Guilt vs. Neutral[b]	9.429	0.748	12.602***		
Guilt vs. Positive[b]	4.848	0.714	6.794***		
Neutral vs. Positive[b]	-4.581	0.737	-6.217***		
Random effect					
Individual variance	11.750	2.429			4.837***

Note. $N = 68$. [a] Higher value corresponds to more intense shame. [b] Bonferroni correction was applied for significance test.

*** $p < .001$.

Table 10

Multilevel Models Testing the Effect of Script Emotion Condition on Guilt Rating

	Guilt[a]				
	Estimate	SE	*t*	95% CI	Wald *Z* (*p*)
Fixed effect					
Shame	10.952	0.463		10.040 – 11.863	
Neutral	0.469	0.517		-0.548 – 1.486	
Guilt	13.517	0.463		12.604 – 14.430	
Positive	1.015	0.523		-0.013 – 2.043	
Overall script condition difference	(*F* (3, 223.666) = 198.657***)				
Guilt vs. Shame, Neutral, Positive	9.372	0.528	17.755***		
Shame vs. Neutral[b]	10.483	0.675	15.519***		
Shame vs. Positive[b]	9.937	0.680	14.612***		
Neutral vs. Positive[b]	-0.546	0.715	-0.764		
Random effect					
Individual variance	6.292	1.514			4.157***

Note. $N = 68$. [a] Higher value corresponds to more intense guilt. [b] Bonferroni correction was applied for significance test.

*** $p < .001$.

Table 11

Descriptive Statistics and Bivariate Correlation Coefficients for Pencil-and-Paper Questionnaire Measures

	Mean	SD	α	BAS	BIS	TS	TG
CES-D	15.485	10.292	0.899	-0.23	.28*	.39**	-0.13
BAS	42.53	5.959	0.680		-0.01	-0.15	0.02
BIS	20.735	3.371	0.657			.53**	0.21
TS	32.059	7.299	0.754				.29*
TG	45.265	4.583	0.660				

Note. CES-D = Center for Epidemiological Studies – Depression scale, BAS = Behavioral Activation System, BIS = Behavioral Inhibition System, TS = Test of Self-Conscious Affect-3, Shame, TG = Test of Self-Conscious Affect-3, Guilt.

* $p < .05$, ** $p < .01$.

Table 12

Results of MLM to Test the Effects of Self-Reported Data of Second Imagery Session on Physiological Reactivity

	Startle response magnitude[a]			Heart rate change[a]			Skin conductance response[b]		
Predictor	Coefficient	SE	t[c]	Coefficient	SE	t[c]	Coefficient	SE	t[c]
Valence	-0.229	0.097	-2.358*	-0.093	0.057	-1.741	0.001	0.003	0.470
Arousal	0.014	0.111	0.124	0.131	0.054	2.292*	0.009	0.003	2.844**
Shame	-0.049	0.035	-1.433	0.004	0.017	0.243	0.001	0.001	0.990
Guilt	0.086	0.038	2.254*	-0.061	0.022	-2.760**	-0.0001	0.001	-0.052
Vividness	0.051	0.139	0.366	-0.037	0.081	-0.452	-0.007	0.005	-1.492

Note. [a] $N = 50$. [b] $N = 47$. [c] The degree of freedom ranged from 1043.800 to 15312.778 across analyses.

* $p < .05$. ** $p < .01$.

Table 13

Results of MLM to Test the Effects of Between-Individual Variables on SRM

Predictor	Coefficient	SE	*df*	*t*
CES-D	-0.046	0.148	49.032	-0.314
BAS	-0.159	0.243	48.963	-0.655
BIS	-0.513	0.501	49.052	-1.023
TS	-0.206	0.226	49.029	-0.911
TG	0.294	0.287	48.947	1.024

Note. N = 49. CES-D = Center for Epidemiological Studies – Depression scale, BAS = Behavioral Activation System, BIS = Behavioral Inhibition System, TS = Test of Self-Conscious Affect-3, Shame, TG = Test of Self-Conscious Affect-3, Guilt.

Appendix A

Emotional Scripts

Shame Scripts

One of my classes requires a 10-page essay that is a really high-stakes paper. It turns out really badly, and I feel like I am stupid and incompetent.

One of my friends really loves a dog. One day, I take care of my friend's dog while my friend is on vacation, and the dog runs away. I think I am irresponsible and useless.

(for male participant) My girlfriend dumps me abruptly. I do not have any clue why. I soon realize that she is seeing another man. I feel like I am an ugly and unattractive person.

(for female participant) My boyfriend dumps me abruptly. I do not have any clue why. I soon realize that he is seeing another woman. I feel like I am an ugly and unattractive person

Guilt Scripts

I practice baseball with my friend on weekend. While playing around, I throw a ball and it hits my friend in the face. I approach my friend and apologize hoping that my friend feels better.

I prepare for a midterm exam of a class. On the exam day, I walk out of an exam thinking I do extremely well. However, I find out I do poorly. I feel regret thinking I should have studied harder.

I prepare for an important project for my class as a team with my classmates. I am responsible for putting everything together. However, I make a big mistake on the project, and my classmates criticize me. I think I should have recognized the problem and done a better job.

Neutral Scripts

I am lying on the sand on a warm day, listening to children playing down the beach, their soft voices mingling with the sound of the waves.

A wood fire dances in the hearth, I feel snug and warm in the cabin, reading the book on my lap, enjoying a well-deserved rest.

A soft smile creeps over my face as I begin to eat my favorite flavor of ice cream while listening to my favorite music on the stereo.

Positive Scripts

(for male participant) As I walk across campus I catch the eye of a beautiful woman from one of my classes walking toward me; she smiles widely as she passes.

Appendix A (cont'd)

(for female participant) As I walk across campus I catch the eye of a handsome man from one of my classes walking toward me; he smiles widely as he passes.

My professor stands in front of the lecture hall and rehashes how disappointed he is reading our papers, but before I know it he is reading my paper, the only A paper in the class.

(for male participant) As I walk out of class the woman I have been watching all semester stops and asks if we can study for the exam together.

(for female participant) As I walk out of class the man I have been watching all semester stops and asks if we can study for the exam together.

Appendix B

TOSCA-3

1. You make plans to meet a friend for lunch. At 5 o'clock, you realize you stood him up.

a) You would think: "I'm inconsiderate." 1---2---3---4---5
not likely very likely

b) You would think: "Well, they'll understand." 1---2---3---4---5
not likely very likely

c) You'd think you should make it up to him as soon as possible. 1---2---3---4---5
not likely very likely

d) You would think: "My boss distracted me just before lunch." 1---2---3---4---5
not likely very likely

2. You break something at work and then hide it.

a) You would think: "This is making me anxious. I need to either fix it or get someone else to." 1---2---3---4---5

b) You would think about quitting. 1---2---3---4---5

c) You would think: "A lot of things aren't made very well these days." 1---2---3---4---5

d) You would think: "It was only an accident." 1---2---3---4---5

3. You are out with friends one evening, and you're feeling especially witty and attractive. Your best friend's spouse seems to particularly enjoy you company.

a) You would think: "I should have been aware of what my best friend is feeling." 1---2---3---4---5

b) You would feel happy with your appearance and personality. 1---2---3---4---5

c) You would feel pleased to have made such a good impression. 1---2---3---4---5

d) You would think your best friend should pay attention to his/her spouse. 1---2---3---4---5

e) You would probably avoid eye-contact for a long time. 1---2---3---4---5

4. At work, you wait until the last minute to plan a project, and it turns out badly.

a) You would feel incompetent. 1---2---3---4---5

b) You would think: "There are never enough hours 1---2---3---4---5

Appendix B (cont'd)

in the day."
c) You would feel: "I deserve to be reprimanded for mismanaging the project." 1---2---3---4---5
d) You would think: "What's done is done." 1---2---3---4---5

5. You make a mistake at work and find out a co-worker is blamed for the error.

a) You would think the company did not like the co-worker. 1---2---3---4---5
b) You would think: "Life is not fair." 1---2---3---4---5

c) You would keep quiet and avoid the co-worker. 1---2---3---4---5

d) You would feel unhappy and eager to correct the situation. 1---2---3---4---5

6. For several days you put off making a difficult phone call. At the last minute you make the call and are able to manipulate the conversation so that all goes well.

a) You would think: "I guess I'm more persuasive than I thought." 1---2---3---4---5
b) You would regret that you put it off. 1---2---3---4---5

c) You would feel like a coward. 1---2---3---4---5

d) You would think: "I did a good job." 1---2---3---4---5

e) You would think you shouldn't have to make calls you feel pressured into. 1---2---3---4---5

7. While playing around, you throw a ball and it hits your friend in the face.

a) You would feel inadequate that you can't even throw a ball. 1---2---3---4---5
b) You would think maybe your friend needs more practice at catching. 1---2---3---4---5
c) You would think: "It was just an accident." 1---2---3---4---5

d) You would apologize and make sure your friend feels better. 1---2---3---4---5

8. You have recently moved away from your family, and everyone has been very helpful. A few times you needed to borrow money, but you paid it back as soon as you could.

Appendix B (cont'd)

a) You would feel immature. 1---2---3---4---5

b) You would think: "I sure ran into some bad luck." 1---2---3---4---5

c) You would return the favor as quickly as you could. 1---2---3---4---5

d) You would think: "I am a trustworthy person." 1---2---3---4---5

e) You would be proud that you repaid your debts. 1---2---3---4---5

9. You are driving down the road, and you hit a small animal.

a) You would think the animal shouldn't have been on the road. 1---2---3---4---5

b) You would think: "I'm terrible." 1---2---3---4---5

c) You would feel: "Well, it was an accident." 1---2---3---4---5

d) You'd feel bad you hadn't been more alert driving down the road. 1---2---3---4---5

10. You walk out of an exam thinking you did extremely well. Then you find out you did poorly.

a) You would think: "Well, it's just a test." 1---2---3---4---5

b) You would think: "The instructor doesn't like me." 1---2---3---4---5

c) You would think: "I should have studied harder." 1---2---3---4---5

d) You would feel stupid. 1---2---3---4---5

11. You and a group of co-workers worked very hard on a project. Your boss singles you out for a bonus because the project was such a success.

a) You would feel the boss is rather short-sighted. 1---2---3---4---5

b) You would feel alone and apart from your colleagues. 1---2---3---4---5

c) You would feel your hard work had paid off. 1---2---3---4---5

d) You would feel competent and proud of yourself. 1---2---3---4---5

Appendix B (cont'd)

e) You would feel you should not accept it. 1---2---3---4---5

12. While out with a group of friends, you make fun of a friend who's not there.

a) You would think: "It was all in fun; it's harmless." 1---2---3---4---5

b) You would feel small...like a rat. 1---2---3---4---5

c) You would think that perhaps that friend should have been there to defend himself/herself. 1---2---3---4---5

d) You would apologize and talk about that person's good points. 1---2---3---4---5

13. You make a big mistake on an important project at work. People were depending on you, and your boss criticizes you.

a) You would think your boss should have been more clear about what was expected of you. 1---2---3---4---5

b) You would feel like you wanted to hide. 1---2---3---4---5

c) You would think: "I should have recognized the problem and done a better job." 1---2---3---4---5

d) You would think: "Well, nobody's perfect." 1---2---3---4---5

14. You volunteer to help with the local Special Olympics for handicapped children. It turns out to be frustrating and time-consuming work. You think seriously about quitting, but then you see how happy the kids are.

a) You would feel selfish and you'd think you are basically lazy. 1---2---3---4---5

b) You would feel you were forced into doing something you did not want to do. 1---2---3---4---5

c) You would think: "I should be more concerned about people who are less fortunate." 1---2---3---4---5

d) You would feel great that you had helped others. 1---2---3---4---5

e) You would feel very satisfied with yourself. 1---2---3---4---5

15. You are taking care of your friend's dog while they are on vacation and the dog runs away.

Appendix B (cont'd)

a) You would think, "I am irresponsible and incompetent." 1---2---3---4---5

b) You would think your friend must not take very good care of their dog or it wouldn't have run away. 1---2---3---4---5

c) You would vow to be more careful next time. 1---2---3---4---5

d) You would think your friend could just get a new dog. 1---2---3---4---5

16. <u>You attend your co-worker's housewarming party and you spill red wine on their new cream-colored carpet, but you think no one notices.</u>

a) You think your co-worker should have expected some accidents at such a big party. 1---2---3---4---5

b) You would stay late to help clean up the stain after the party. 1---2---3---4---5

c) You would wish you were anywhere but at the party. 1---2---3---4---5

d) You would wonder why your co-worker chose to serve red wine with the new light carpet. 1---2---3---4---5

Appendix C

Post-Experimental Questionnaire

1. How carefully would you say you followed the imagery instruction given in the study?

1	2	3	4	5	6	7	8	9
Not carefully at all				Neutral				Extremely carefully

2. How easy/difficult was it for you to follow the imagery instruction given in the study?

1	2	3	4	5	6	7	8	9
Extremely easy				Neutral				Extremely difficult

3. How much effortful was it for you to vividly imagine the situations?

1	2	3	4	5	6	7	8	9
Extremely easy				Neutral				Extremely difficult

4. How carefully would you say you followed the relaxation instruction given in the study?

1	2	3	4	5	6	7	8	9
Not carefully at all				Neutral				Extremely carefully

5. How easy/difficult was it for you to follow the relaxation instruction given in the study?

1	2	3	4	5	6	7	8	9
Extremely easy				Neutral				Extremely difficult

6. How much effortful was it for you to relax during relaxation period?

1	2	3	4	5	6	7	8	9
Extremely easy				Neutral				Extremely difficult

Appendix D

Imagery Rating

Please rate each question to indicate your experience while you were imaging the script ‘A’/’B’

1. The degree of pleasure/contentment/happiness you felt (1 = extreme displeasure, 5 = neutral, 9 = extreme pleasure)

1 2 3 4 5 6 7 8 9

Extreme displeasure Neutral Extreme pleasure

2. The degree of arousal/provocation/stimulation you felt (1 = extreme calmness, 5 = neutral, 9 = extreme arousal)

1 2 3 4 5 6 7 8 9

Extreme calmness Neutral Extreme arousal

3. The degree of vividness/clearness of imagery you created (1 = extreme unvividness, 5 = neutral, 9 = extreme vividness)

1 2 3 4 5 6 7 8 9

Extreme unvividness Neutral Extreme vividness

Appendix E

PFQ-2

Please indicate how much of each following emotion you felt while imagining the script. Use the following scale to record your answers.

0	1	2	3	4
never	a little bit	moderately	strongly	very strongly

Embarrassed ( )

Feeling ridiculous ( )

Self-Consciousness ( )

Intense guilt ( )

Regret ( )

Feeling helpless, paralyzed ( )

Feeling deserve criticism for what you did ( )

Feeling disgusting to others ( )

Mild guilt ( )

Worry about hurting or injuring someone ( )

Feeling humiliated ( )

Feeling “stupid” ( )

Feeling “childish” ( )

Feelings of blushing ( )

Feeling laughable ( )

Remorse ( )

Appendix F

CES-D

Using the scale below, indicate the number which best describes how often you felt or behaved this way-DURING THE PAST WEEK.

1 = Rarely or none of the time (less than 1 day)
2 = Some or a little of the time (1-2 days)
3 = Occasionally or a moderate amount of time (3-4 days)
4 = Most or all of the time (5-7 days)

DURING THE PAST WEEK:

1. I was bothered by things that usually don't bother me.	1	2	3	4
2. I did not feel like eating; my appetite was poor.	1	2	3	4
3. I felt that I could not shake off the blues even with help from my family or friends.	1	2	3	4
4. I felt that I was just as good as other people.	1	2	3	4
5. I had trouble keeping my mind on what I was doing.	1	2	3	4
6. I felt depressed.	1	2	3	4
7. I felt that everything I did was an effort.	1	2	3	4
8. I felt hopeful about the future.	1	2	3	4
9. I thought my life had been a failure.	1	2	3	4
10. I felt fearful.	1	2	3	4
11. My sleep was restless.	1	2	3	4
12. I was happy.	1	2	3	4
13. I talked less than usual.	1	2	3	4
14. I felt lonely.	1	2	3	4
15. People were unfriendly.	1	2	3	4
16. I enjoyed life.	1	2	3	4
17. I had crying spells.	1	2	3	4
18. I felt sad.	1	2	3	4
19. I felt that people disliked me.	1	2	3	4
20. I could not get "going."	1	2	3	4

Appendix G

BIS/BAS

Each item of this questionnaire is a statement that a person may either agree with or disagree with. For each item, indicate how much you agree or disagree with what the item says. Please respond to all the items; do not leave any blank. Choose only one response to each statement. Please be as accurate and honest as you can be. Respond to each item as if it were the only item. That is, don't worry about being "consistent" in your responses. Choose from the following four response options:

1 = very true for me
2 = somewhat true for me
3 = somewhat false for me
4 = very false for me

1. A person's family is the most important thing in life. ( )
2. Even if something bad is about to happen to me, I rarely experience fear or nervousness. ( )
3. I go out of my way to get things I want. ( )
4. When I'm doing well at something I love to keep at it. ( )
5. I'm always willing to try something new if I think it will be fun. ( )
6. How I dress is important to me. ( )
7. When I get something I want, I feel excited and energized. ( )
8. Criticism or scolding hurts me quite a bit. ( )
9. When I want something I usually go all-out to get it. ( )
10. I will often do things for no other reason than that they might be fun. ( )

11. It's hard for me to find the time to do things such as get a haircut. ( )
12. If I see a chance to get something I want I move on it right away. ( )
13. I feel pretty worried or upset when I think or know somebody is angry at me. ( )
14. When I see an opportunity for something I like I get excited right away. ( )
15. I often act on the spur of the moment. ( )
16. If I think something unpleasant is going to happen I usually get pretty "worked up." ( )
17. I often wonder why people act the way they do. ( )
18. When good things happen to me, it affects me strongly. ( )
19. I feel worried when I think I have done poorly at something important. ( )
20. I crave excitement and new sensations. ( )

21. When I go after something I use a "no holds barred" approach. ( )
22. I have very few fears compared to my friends. ( )
23. It would excite me to win a contest. ( )
24. I worry about making mistakes. ( )

Appendix H

Experimental Instruction

Thank you very much for your participation in today's study. As you already know, the purpose of this study is to understand people's reactions to various situations encountered in life. There are several parts to this study. First, I'll ask you to imagine a series of situations while we record various physiological reactions, such as your heart rate. Second, you will be asked to imagine the situations one more time and you will complete some scales measuring how you feel when you imagine the situations. Third, I'll ask you to complete several questionnaires about different psychological traits and attitudes. Finally, we'll have a short discussion about the study and then your participation will be complete. Before I go into more detail about the different parts of the study, I'll ask you to carefully read this informed consent form and sign at the bottom of the second page if you agree to participate. Please alert me if you have any questions. (Participant provides informed consent).

Now we'll begin imagery session of the study. Previously, I mentioned that we'll be recording various physiological reactions while you imagine the situations. The first thing we will do is to attach the sensors which will allow us to measure your physiological reactions. As I'm attaching the sensors, I'll explain what they measure and answer any questions you might have about the physiological recording. (Experimenter prepares skin for attachment of electrodes and attaches electrodes. During this time, all physiological measures [startle EMG, ECG, and skin conductance] will be thoroughly explained.

Now that the sensors have been attached, I'll explain the imagery session in more detail. Throughout the experiment, you will imagine several situations in which people often experience various emotions. When you imagine a situation, please actively imagine it as if it were really happening. It is important that you vividly experience each situation. Do you have any question so far? (Answer questions as indicated)

The whole imagery session consists of six sub-sections. At each section, you will imagine two different situations for several times, and each situation will be paired with letter 'A' or 'B'. You will first read and create vivid imagery of each situation before we begin the imagery session. It will help you actively imagine them during the imagery session.

When the imagery session begins after I leave this room, each letter will be presented on the computer screen repeatedly. Immediately after you see a letter, please imagine an event corresponding to each letter. While you imagine the event, a word 'Relaxation' will appear on the computer monitor. Then, please stop imagining the scene and try to relax. Think the word 'one' when you exhale. It will help you relax and clear your mind. Then, at some point, a letter will be shown on the computer screen. Then, please imagine an event corresponding to the letter. In other words, the sequence will go imagery, relaxation, imagery, relaxation, and so on. It is

Appendix H (cont'd)

important that your attention should always be directed toward the computer monitor. In a minute, I will ask you to put on these headphones. You will occasionally hear some brief loud noises through the headphones; these noises can be ignored.

When you complete a section, I will come back and give you another set of two situations that are different from the first set. You will repeat the same procedure until you complete the whole imagery session. Do you have any question so far? (Answer questions indicated)

Lastly, I'd like to say a few words about this camera that you read about in the informed consent form. (Point to webcam) The camera will capture a video image of you seated in the chair and feed it to the room next door, where I'll be seated. The video feed is not recorded; we just use it to make sure that everything is going smoothly with the experiment. Does this sound OK to you? (Address concerns as needed)

OK. Here are the first two situations you will imagine (Hand in the scripts to participants). Please first read each script and create vivid imagery of personally engaging in the events described. Make sure which letter corresponds to which situation. Please let me know when you create vivid imagery of each event. (Experimenter leaves room and comes back when participants are ready)

Remember you will see a letter (either 'A' or 'B') on the computer monitor. Then, please actively imagine a situation corresponding to each letter. Now I'm going to leave the room and start imagery session. (Experimenter leaves room)

(Participants complete the first block of imagery session; experimenter returns to room)

OK. Here is the second set of situations you will imagine (Hand in the scripts to participants). (Repeat the same procedure as before).

(Experimenter returns after first imagery session is completed) OK. The first imagery session was just completed. Please answer these questions. I'd like to learn how the session was like for you. (Hand the in manipulation check questionnaire)

(Upon the completion of the manipulation questionnaire) OK. I will now remove the sensors.

(Upon removal of the sensors) OK. You will imagine the situations one more time. We will use powerpoint slide show for this part. Each script will be shown on the screen and stay about 4 seconds. Begin to create image of the script. And then a blank slide will appear. Please actively imagine the situation until another slide appears. This slide will tell that you report your imagery experience using these scales (show PFQ-2 and Imagery Rating scale). After you complete these scales, please click the computer mouse to move to the next slide. You will then repeat the same procedure until you imagine all 12 scripts. Any question? (Experimenter leaves the room)

Appendix H (cont'd)

(Experimenter returns when the second imagery session is completed) OK. We will now move to the last part of this study. I'll ask you to fill out these questionnaires. As you'll see, the questionnaires ask about lots of different subjects related to psychological traits and attitudes. Once again, please alert me if you have any questions.

Appendix I

Debriefing Statement

First of all, thank you so much for your participation in the study. It is genuinely appreciated.

You were informed at the start of the session that this study aimed to understand people's reactions to various situations encountered in life. Now let me say more about this. Psychologists have long been interested in discovering what happens inside the body during different emotional states such as joy, shame, guilt, and so on. In this study, we measured several physiological variables and tried to determine how they were affected by your imagining the emotional situations. The sensors on your left hand were measuring changes in your sweat response. These changes were very subtle; you probably didn't feel yourself sweating during the experiment. The sensors on your forearms were measuring your heart rhythm. The sensors attached to your face were measuring activity in small muscles responsible for generating facial expressions of emotion. Although our knowledge of bodily changes during the experience of emotion has increased over the years, the emotion of shame and guilt continues to puzzle psychologists. We're still unsure about the pattern of physiological changes that occur when people feel shame or guilt. Several situations you have imagined in this study have been shown to make people feel guilt or shame. So, what we plan to do is analyze the physiological reactions associated with feelings of shame and guilt. We also plan to examine whether your responses to the questionnaires you filled out relate to your physiological reactions. Do you have any questions about the study description that I just provided? (Answer questions as indicated)

Before you leave, I want to make absolutely certain that you're not experiencing any undue distress related to this experiment. People often express moderate level of distress due to their feelings of shame and guilt. May we talk for a moment about how you're feeling? (Address concerns as indicated)

Do you have any questions about anything you have experienced today, the rationale for this study or anything else? (Answer questions as indicated).

Once again, thank you so much for your participation. Have a great day.

References

Abelson, R., & Sermat, V. (1962). Multidimensional scaling of facial expressions. *Journal of Experimental Psychology, 63,* 546-554. doi: 10.1037/h0042280

Angrilli, A., Mauri, A., Palomba, D., Flor, H., Birbaumer, N., Sartori, G. et al. (1996). Startle reflex and emotion modulation impairment after a right amygdala lesion. *Brain, 119,* 1991-2000. doi: 10.1093/brain/119.6.1991

Barrett, K., Zahn-Waxler, C., & Cole, Pamela. (1993). Avoiders vs. amenders: Implications for the investigation of guilt and shame during toddlerhood? *Cognition and Emotion, 7,* 481-505. doi: 10.1080/02699939308409201

Barrett, L., & Russell, J. (1998). Independence and bipolarity in the structure of current affect. *Journal of Personality and Social Psychology, 74,* 967-984. doi: 10.1037/0022-3514.74.4.967

Baumeister, R., & Leary, M. (1995). The need to belong: Desire for interpersonal attachments as a fundamental human motivation. *Psychological Bulletin, 117,* 497-529. doi: 10.1037/0033-2909.117.3.497

Baumesiter, R., Stillwell, A., & Heatherton, T. (1994). Guilt: An interpersonal approach. *Psychological Bulletin, 115,* 243-267. doi: 10.1037/0033-2909.115.2.243

Blumenthal, T., Cuthbert, B., Filion, D., Hackley, S., Lipp, O., & Boxtel, A. (2005). Committee report: Guidelines for human startle eyeblink electromyographic studies. *Psychophysiology, 42,* 1-15. doi: 10.1111/j.1469-8986.2005.00271.x

Bradley, M., Cuthbert, B., & Lang, P. (1999). Affect and startle reflex. In M. Dawson, A. Schell., & A. Bohmelt (Eds.), *Startle modification: Implications for neuroscience,*

cognitive science, and clinical science (pp. 157-183). New York: Cambridge University Press.

Bradley, M., Lang, P., & Cuthbert, B. (1993). Emotion, novelty, and the startle reflex: Habituation in humans. *Behavioral Neuroscience, 107*, 970-980. doi: 10.1037/0735-7044.107.6.970

Brehm, J., & Self, E. (1989). The intensity of motivation. *Annual Review of Psychology, 40,* 109-131. doi: 10.1146/annurev.ps.40.020189.000545

Brown, J., & Weiner, B. (1984). Affective consequences of ability versus effort ascriptions: Controversies, resolutions, and quandaries. *Journal of Educational Psychology, 76,* 148-158. doi: 10.1037/0022-0663.76.1.146

Buss, K., Schumacher, J., Dolski, I., Kalin, N., Goldsmith, H., & Davidson, R. (2003). Right frontal brain activity, cortisol, and withdrawal behavior in 6-month-old infants. *Behavioral neuroscience, 117,* 11-20. doi: 10.1037/0735-7044.117.1.11

Carver, C. (2001). Affect and the functional bases of behavior: On the dimensional structures of affective experience. *Personality and Social Psychology Review, 5,* 345-356. doi: 10.1207/S15327957PSPR0504_4

Carver, C. (2003). Pleasure as a sign you can attend to something else: Placing positive feelings within a general mood of affect. *Cognition and Emotion, 17,* 241-261. doi: 10.1080/02699930302294

Carver, C. (2004). Negative affects deriving from the behavioral approach system. *Emotion, 4,* 3-22. doi: 10.1037/1528-3542.4.1.3

Carver, C., Sutton, S., & Scheier, M. (2000). Action, emotion, and personality: Emerging conceptual integration. *Personality and Social Psychology Bulletin, 26,* 741-750. doi: 10.1177/0146167200268008

Carver, C., & White, T. (1994). Behavioral inhibition, behavioral activation, and affective responses to impending reward and punishment: The BIS/BAS scales. *Journal of Personality and Social Psychology, 67,* 319-333. doi: 10.1037/0022-3514.67.2.319

Chen, M., & Bargh, J. (1999). Consequences of autonomic evaluation: Immediate behavioral predispositions to approach or avoid the stimulus. *Personality and Social Psychology Bulletin, 25,* 215-224. doi: 10.1177/0146167299025002007

Coan, J., Allen, J., & Harmon-Jones, E. (2001). Voluntary facial expression and hemispheric asymmetry over the frontal cortex. *Psychophysiology, 38,* 912-925. doi: 10.1111/1469-8986.3860912

Cook, E., Hawk, L., Davis, T., & Stevenson, V. (1991). Affective individual differences and startle reflex modulation. *Journal of Abnormal Psychology, 100,* 5-13. doi: 10.1037/0021-843X.100.1.5

Cook, E., Melamed, B., Cuthbert, B., McNeil, D., & Lang, P. (1988). Emotional imagery and the differential diagnosis of anxiety. *Journal of Consulting and Clinical Psychology, 56,* 734-740. doi: 10.1037/0022-006X.56.5.734

Covington, M., & Omelich, C. (1984). An empirical examination of Weiner's critique of attribution research. *Journal of Educational Psychology, 76,* 1214-1225. doi: 10.1037/0022-0663.76.6.1214

Crossman, A., Sullivan, M., Hitchcock, D., & Lewis, M. (2009). When frustration is repeated: Behavioral and emotion responses during extinction over time. *Emotion, 9,* 92-100. doi: 10.1037/a0014614

Cuthbert, B., Kristeller, J., Simons, R., Hodes, R., & Lang, P. (1981). Strategies of arousal control: Biofeedback, meditation, and motivation. *Journal of Experimental Psychology: General, 110,* 518-546. doi: 10.1037/0096-3445.110.4.518

Davidson, R. (1998). Affective style and affective disorders: Perspective from affective neuroscience. *Cognition and Emotion, 12,* 307-330. doi: 10.1080/026999398379628

Davidson, R., & Fox, N. (1989). Frontal brain asymmetry predicts infants' response to maternal separation. *Journal of Abnormal Psychology, 98,* 127-131. doi: 10.1037/0021-843X.98.2.127

Dawson, M., Schell, A., & Bohmelt, A. (1999). *Startle modification: Implications for neuroscience, cognitive science, and clinical science.* New York: Cambridge University Press.

Diener, E., Smith, H., & Fujita, F. (1995). The personality structure of affect. *Journal of Personality and Social Psychology, 69,* 130-141. doi: 10.1037/0022-3514.69.1.130

Donatelli, J., Bybee, J., & Buka, S. (2007). What do mothers make adolescents feel guilty about? Incidents, reactions, and relation to depression. *Journal of Child and Family Studies, 16,* 859-875. doi: 10.1007/s10826-006-9130-1

Drobes, D., Miller, E., Hillman, C., Bradley, M., Cuthbert, B., & Lang, P. (2001). Food deprivation and emotional reactions to food cues: Implications for eating disorders. *Biological Psychology, 57,* 153-177. doi: 10.1016/S0301-0511(01)00093-X

Ekman, P., & Friesen, W. (1975). *Unmasking the face: A guide to recognizing emotions from facial clues.* Oxford, England: Prentice-Hall.

Fischer, K., Shaver, P., & Carnochan, P. (1990). How emotions develop and how they organize development. *Cognition and Emotion, 4,* 81-127. doi: 10.1080/02699939008407142

Fox, N., Coplan, R., Rubin, K., Porges, S., Calkins, S., Long, J. et al. (1995). Frontal activation asymmetry and social competence at four years of age. *Child Development, 66,* 1770-1784. doi: 10.2307/1131909

Fredrickson, B. (1998). What good are positive emotions? *Review of General Psychology, 2,* 300-319. doi: 10.1037/1089-2680.2.3.300

Fredrickson, B., & Branigan, C. (2005). Positive emotions broaden the scope of attention and thought-action repertoires. *Cognition and Emotion, 19,* 313-332. doi: 10.1080/02699930441000238

Fredrickson, B., & Losada, M. (2005). Positive affect and the complex dynamics of human flourishing. *American Psychologist, 60,* 678-686. doi: 10.1037/0003-066X.60.7.678

Fredrickson, B., & Roberts, T. (1997). Objectification theory: Toward understanding women's lived experiences and mental health risks. *Psychology of Women Quarterly, 21,* 173-206. doi: 10.1111/j.1471-6402.1997.tb00108.x

Fredrickson, B., Roberts, T., Noll, S., Quinn, D., & Twenge, J. (1998). That swimsuit becomes you: Sex differences in self-objectification, restrained eating, and math performance. *Journal of Personality and Social Psychology, 75,* 269-284. doi: 10.1037/0022-3514.75.1.269

Frijda, N. (1986). *The emotions.* New York: Cambridge University Press.

Frijda, N., Kuipers, P., & Schure, E. (1989). Relations among emotion, appraisal, and emotional action readiness. *Journal of Personality and Social Psychology, 57,* 212-228. doi: 10.1037/0022-3514.57.2.212

Gilbert, P. (1997). The evolution of social attractiveness and its role in shame, humiliation, guilt and therapy. *British Journal of Medical Psychology, 70,* 113-147. doi: 10.1111/j.2044-8341.1997.tb01893.x

Gilbert, P. (2003). Evolution, social roles, and the differences in shame and guilt. *Social Research, 70,* 1205-1230.

Gilbert, P., & Miles, J. (2000). Sensitivity to social put-down: It's relationship to perceptions of social rank, shame, social anxiety, depression, anger and self-other blame. *Personality and Individual Differences, 29,* 757-774. doi: 10.1016/S0191-8869(99)00230-5

Graham, S. (1988). Children's developing understanding of the motivational role of affect: An attributional analysis. *Cognitive Development, 3,* 71-88. doi: 10.1016/0885-2014(88)90031-7

Harder, D., & Zalma, A. (1990). Two promising shame and guilt scales: A construct validity comparison. *Journal of Personality Assessment, 55,* 729-745. doi: 10.1207/s15327752jpa5503&4_30

Harmon-Jones, E. (2003a). Clarifying the emotive functions of asymmetrical frontal cortical activity. *Psychophysiology, 40,* 838-848. doi: 10.1111/1469-8986.00121

Harmon-Jones, E. (2003b). Anger and the behavioral approach system. *Personality and Individual Differences, 35,* 995-1005. doi: 10.1016/S0191-8869(02)00313-6

Harmon-Jones, E. (2006). Unilateral right-hand contractions cause contralateral alpha power suppression and approach motivational affective experience. *Psychophysiology, 43,* 598-603. doi: 10.1111/j.1469-8986.2006.00465.x

Harmon-Jones, E., Abramson, L., Sigelman, J., Bohlig, A., Hogan, M., & Harmon-Jones, C. (2002). Proneness to hypomania/mania symptoms or depressive symptoms and asymmetrical frontal cortical responses to an anger-evoking event. *Journal of Personality and Social Psychology, 82,* 610-618. doi: 10.1037/0022-3514.82.4.610

Harmon-Jones, E., & Allen, J. (1997). Behavioral activation sensitivity and resting frontal EEG asymmetry: Covariation of putative indicators related to risk for mood disorders. *Journal of Abnormal Psychology, 106,* 159-163. doi: 10.1037/0021-843X.106.1.159

Harmon-Jones, E., & Allen, J. (1998). Anger and frontal brain activity: EEG asymmetry consistent with approach motivation despite negative affective valence. *Journal of Personality and Social Psychology, 74,* 1310-1316. doi: 10.1037/0022-3514.74.5.1310

Harmon-Jones, E., Lueck, L., Fearn, M., & Harmon-Jones, C. (2006). The effect of personal relevance and approach-related action expectation on relative left frontal cortical activity. *Psychological Science, 17,* 434-440. doi: 10.1111/j.1467-9280.2006.01724.x

Harmon-Jones, E., Peterson, H., & Vaughan, K. (2003). The dissonance-inducing effects of an inconsistency between experienced empathy and knowledge of past failure to help: Support for the action-based model of dissonance. *Basic and Applied Social Psychology, 25*, 69-78. doi: 10.1207/S15324834BASP2501_5

Harmon-Jones, E., & Sigelman, J. (2001). State anger and prefrontal brain activity: Evidence that insult-related relative left-prefrontal activation is associated with experienced anger and

aggression. *Journal of Personality and Social Psychology, 80,* 797-803. doi: 10.1037/0022-3514.80.5.797

Harmon-Jones, E., & Sigelman, J., Bohlig, A., & Harmon-Jones, C. (2003). Anger, coping, and frontal cortical activity: The effect of coping potential on anger-induced left frontal activity. *Cognition and Emotion, 17,* 1-24. doi: 10.1080/02699930302278

Harmon-Jones, Vaughn-Scott, K., Mohr, S., Sigelman, J., & Harmon-Jones, C. (2004). The effect of manipulated sympathy and anger on left and right frontal cortical activity. *Emotion, 4,* 95-101. doi: 10.1037/1528-3542.4.1.95

Higgins, E. (1987). Self-discrepancy: A theory relating self and affect. *Psychological Review, 94,* 319-340. doi: 10.1037/0033-295X.94.3.319

Hitchcock, J., & Davis, M. (1986). Efferent pathway of the amygdala involved in conditioned fear as measured with the fear-potentiated startle paradigm. *Behavioral Neuroscience, 105,* 826-842. doi: 10.1037/0735-7044.105.6.826

Hooge, I., Zeelenberg, M., & Breugelmans, S. (2007). Moral sentiments and cooperation: Differential influences of shame and guilt. *Cognition and Emotion, 21,* 1025-1042. doi: 10.1080/02699930600980874

Izard, C. (2007). Basic emotions, natural kinds, emotion schemas, and a new paradigm. *Perspectives on Psychological Science, 2,* 260-280. doi: 10.1111/j.1745-6916.2007.00044.x

Jackson, D., Malmstadt, J., Larson, C., & Davidson, R. (2000). Suppression and enhancement of emotional responses to unpleasant pictures. *Psychophysiology, 37,* 515-522. doi: 10.1017/S0048577200990401

Jagacinski, C., & Nicholls, J. (1984). Conceptions of ability and related affects in task involvement and ego involvement. *Journal of Educational Psychology, 76,* 909-919. doi: 10.1037/0022-0663.76.5.909

Johnson, S., Turner, R., & Iwata, N. (2003). BIS/BAS levels and psychiatric disorder: An epidemiological study. *Journal of Psychopathology and Behavioral Assessment, 25*, 25-36. doi: 10.1023/A:1022247919288

Kalin, N., Larson, C., Shelton, S., & Davidson, R. (1998). Asymmetric frontal brain activity, cortisol, and behavior associated with fearful temperament in Rhesus monkeys. *Behavioral Neuroscience, 112,* 286-292. doi: 10.1037/0735-7044.112.2.286

Kang, D., Davidson, R., Coe, C., Wheeler, R., Tomarken, A., & Ershler, W. (1991). Frontal brain asymmetry and immune function. *Behavioral Neuroscience, 105,* 860-869. doi: 10.1037/0735-7044.105.6.860

Kasch, K., Rottenberg, J., Arnow, B., & Gotlib, I. (2002). Behavioral activation and inhibition systems and the severity and course of depression. *Journal of Abnormal Psychology, 111*, 589-597. doi: 10.1037/0021-843X.111.4.589

Kim, S., Thibodeau, R., & Jorgensen, R. (2011). Shame, guilt and depressive symptoms: A meta-analytic review. *Psychological Bulletin, 137*, 68-96. doi: 10.1037/a0021466

Kinsbourne, M. (1988). Hemisphere interactions in depression. In M. Kinsbourne (Ed.), *Cerebral hemisphere function in depression* (pp. 133-162). Washington, DC: American Psychiatric Press.

Kristjansson, S., Kircher, J., & Webb, A. (2007). Multilevel models for repeated measures research designs in psychophysiology: An introduction to growth curve modeling. *Psychophysiology, 44*, 728-736. doi: 10.1111/j.1469-8986.2007.00544.x

Lang, P. (1968). Fear reduction and fear behavior: Problems in treating a construct. In J.M. Schlien (Ed.), *Research in Psychotherapy, Vol. 3* (pp. 90-103). Washington, DC: American Psychological Association.

Lang, P. (1977). Imagery in therapy: An information processing analysis of fear. *Behavior Therapy, 8,* 862-886. doi: 10.1016/S0005-7894(77)80157-3

Lang, P. (1979). A bio-informational theory of emotional imagery. *Psychophysiology, 16,* 495-512. doi: 10.1111/j.1469-8986.1979.tb01511.x

Lang, P. (1994). The varieties of emotional experience: A meditation on James-Lange theory. *Psychological Review, 101,* 211-221. doi: 10.1037/0033-295X.101.2.211

Lang, P. (1995). The emotion probe: Studies of motivation and attention. *American Psychologist, 50,* 372-385. doi: 10.1037/0003-066X.50.5.372

Lang, P., Bradley, M., & Cuthbert, B. (1990). Emotion, attention, and the startle reflex. *Psychological Review, 97,* 377-395. doi: 10.1037/0033-295X.97.3.377

Lang, P., Bradley, M., & Cuthbert, B. (1998). Emotion, motivation, and anxiety: Brain mechanisms and psychophysiology. *Biological Psychiatry, 44,* 1248-1263. doi: 10.1016/S0006-3223(98)00275-3

Lang, P., Levin, D., Miller, G., & Kozak, M. (1983). Fear behavior, fear imagery, and the psychophysiology of emotion: The problem of affective response integration. *Journal of Abnormal Psychology, 92,* 276-306. doi: 10.1037/0021-843X.92.3.276

Leeper, R. (1948). A motivational theory of emotion to replace 'emotion as disorganized response.' *Psychological Review, 55,* 5-21. doi: 10.1037/h0061922

Leith, K., & Baumeister, R. (1998). Empathy, shame, guilt, and narrative of interpersonal conflicts: Guilt-prone people are better at perspective taking. *Journal of Personality, 66,* 1-37. doi: 10.1111/1467-6494.00001

Levine, L. (1995). Young Children's understanding of the causes of anger and sadness. *Child Development, 66,* 697-709. doi: 10.2307/1131944

Lewis, H. (1971). *Shame and Guilt in Neurosis.* New York: International Universities Press.

Luyten, P., Fontaine, J., & Corveleyn, J. (2002). Does the test of self-conscious affect (TOSCA) measure maladaptive aspects of guilt and adaptive aspects of shame? An empirical investigation. *Personality and Individual Differences, 33,* 1373-1387. doi: 10.1016/S0191-8869(02)00197-6

Lindsay-Hartz, J. (1984). Contrasting experience of shame and guilt. *American Behavioral Scientist, 27,* 689-704. doi: 10.1177/000276484027006003

Marschall, D., Sanftner, J., & Tangney, J. (1994). *The State Shame and Guilt Scale*. Fairfax, VA: George Mason University.

McGraw, K. (1987). Guilt following transgression: An attribution of responsibility approach. *Journal of Personality and Social Psychology, 53,* 247-256. doi: 10.1037/0022-3514.53.2.247

McKinley, N., & Hyde, J. (1996). The objectified body consciousness scale. *Psychology of Women Quarterly, 20,* 181-215. doi: 10.1111/j.1471-6402.1996.tb00467.x

McNeil, D., Vrana, S., Melamed, B., Cuthbert, B., & Lang, P. (1993). Emotional imagery in simple and social phobia: Fear versus anxiety. *Journal of Abnormal Psychology, 102,* 212-225. doi: 10.1037/0021-843X.102.2.212

Miller, G., Levin, D., Kozak, M., Cook, E., McLean, A., & Lang, P. (1987). Individual differences in imagery and the psychophysiology of emotion. *Cognition and Emotion, 1,* 367-390. doi: 10.1080/02699938708408058

Miller, G., Patrick, C., & Levenston, G. (2002). Affective imagery and the startle response: Probing mechanisms of modulation during pleasant scenes, personal experiences, and discrete negative emotions. *Psychophysiology, 39,* 519-529. doi: 10.1017/S0048577202394095

Nesse, R., & Ellsworth, P. (2009). Evolution, emotions, and emotional disorders. *American Psychologist, 64,* 129-139. doi: 10.1037/a0013503

Niedenthal, P., Tangney, J., & Gavanski, I. (1994). "If only I weren't" versus "if only I hadn't": Distinguishing shame and guilt in counterfactual thinking. *Journal of Personality and Social Psychology, 67,* 585-595. doi: 10.1037/0022-3514.67.4.585

Noll, S., & Fredrickson, B. (1998). A mediational model linking self-objectification, body shame, and disordered eating. *Psychology of Women Quarterly, 22,* 623-636. doi: 10.1111/j.1471-6402.1998.tb00181.x

Osgood, C. (1969). On the whys and wherefores of E, P, and A. *Journal of Personality and Social Psychology, 12,* 194-199. doi: 10.1037/h0027715

Panksepp, J. (2007). Neurologizing the psychology of affects: How appraisal-based constructivism and basic emotion theory can coexist. *Perspectives on Psychological Science, 2,* 281-296. doi: 10.1111/j.1745-6916.2007.00045.x

Patrick, C., Cuthbert, B., & Lang, P. (1994). Emotion in the criminal psychopath: Fear image processing. *Journal of Abnormal Psychology, 103,* 523-534. doi: 10.1037/0021-843X.103.3.523

Quene, H., & van den Bergh, H. (2004). On multi-level modeling of data from repeated measures designs: A tutorial. *Speech Communication, 43*, 103-121. doi: 10.1016/j.specom.2004.02.004

Radloff, L. (1977). The CES-D Scale: A self-report depression scale for research in the general population. *Applied Psychological Measurement, 1*, 385-401. doi: 10.1177/014662167700100306

Roseman, I. (1991). Appraisal determinants of discrete emotions. *Cognition and Emotion, 5*, 161-200. doi: 10.1080/02699939108411034

Roseman, I., Spindel, M., & Jose, P. (1990). Appraisals of emotion-eliciting events: Testing a theory of discrete emotions. *Journal of Personality and Social Psychology, 59,* 899-913. doi: 10.1037/0022-3514.59.5.899

Roseman, I., Wiest, C., & Swartz, T. (1994). Phenomenology, behaviors, and goals differentiate discrete emotions. *Journal of Personality and Social Psychology, 67,* 206-221. doi: 10.1037/0022-3514.67.2.206

Rosenberg, E. (1998). Levels of analysis and the organization of affect. *Review of General Psychology, 2*, 247-270. doi: 10.1037/1089-2680.2.3.247

Russell, J. (1978). Evidence of convergent validity on the dimensions of affect. *Journal of Personality and Social Psychology, 36,* 1152-1168. doi: 10.1037/0022-3514.36.10.1152

Russell, J. (1979). Affective space is bipolar. *Journal of Personality and Social Psychology, 37*, 345-356. doi: 10.1037/0022-3514.37.3.345

Russell, J. (1980). A circumplex model of affect. *Journal of Personality and Social Psychology, 39,* 1161-1178. doi: 10.1037/h0077714

Schlosberg, H. (1952). The description of facial expressions in terms of two dimensions. *Journal of Experimental Psychology, 44,* 229-237. doi: 10.1037/h0055778

Schlosberg, H. (1954). Three dimensions of emotion. *Psychological Review, 61,* 81-88. doi: 10.1037/h0054570

Schneirla, T. (1959). An evolutionary and developmental theory of biphasic processes underlying approach and withdrawal. In M.R. Jones (Ed.), *Nebraska symposium on motivation* (pp. 1-42). Oxford, England: University of Nebraska Press.

SenSyr LLC. (2010). *TrialViewer3*. Syracuse, NY.

Shaver, P., Schwartz, J., Kirson, D., & O'Connor, C. (1987). Emotion knowledge: Further exploration of a prototype approach. *Journal of Personality and Social Psychology, 52,* 1061-1086. doi: 10.1037/0022-3514.52.6.1061

Silberman, E.K., & Weingartner, H. (1986). Hemispheric lateralization of functions related to emotion. *Brain and Cognition, 5,* 322-353. doi: 10.1016/0278-2626(86)90035-7

Slater, A., & Tiggemann, M. (2002). A test of objectification theory in adolescent girls. *Sex Roles, 46,* 343-349. doi: 10.1023/A:1020232714705

Snijders, T., & Bosker, R. (1993). Standard errors and sample sizes for two-level research. *Journal of Educational Statistics, 18,* 237-259. doi: 10.2307/1165134

SPSS Inc. (2011). *IBM SPSS Statistics 20.0*. Chicago, IL.

Sutton, S.K., & Davidson, R.J. (1997). Prefrontal brain asymmetry: A biological substrate of the behavioral approach and inhibition systems. *Psychological Science, 8,* 204-210. doi: 10.1111/j.1467-9280.1997.tb00413.x

Tangney, J. (1991). Moral affect: The good, the bad, and the ugly. *Journal of Personality and Social Psychology, 61,* 598-607. doi: 10.1037/0022-3514.61.4.598

Tangney, J. (1995). Recent advances in the empirical study of shame and guilt. *American Behavioral Scientist, 38,* 1132-1145. doi: 10.1177/0002764295038008008

Tangney, J. (1996). Conceptual and methodological issues in the assessment of shame and guilt. *Behaviour Research and Therapy, 34*, 714-754. doi: 10.1016/0005-7967(96)00034-4

Tangney, J., & Dearing, R. (2002). *Shame and guilt.* New York: Guilford.

Tangney, J., Dearing, R., Wagner, P., & Gramzow, R. (2000). *The Test of Self-Conscious Affect-3 (TOSCA-3)*. Fairfax, VA: George Mason University.

Tangney, J., Miller, R., Flicker, L., & Barlow, D. (1996). Are shame, guilt, and embarrassment distinct emotions? *Journal of Personality and Social Psychology*, *70,* 1256-1269. doi: 10.1037/0022-3514.70.6.1256

Tangney, J., Wagner, P., & Gramzow, R. (1992). Proneness to shame, proneness to guilt, and psychopathology. *Journal of Abnormal Psychology, 101*, 469-478. doi: 10.1037/0021-843X.101.3.469

Thibodeau, R. (2009). Does approach-related anger attenuate eyeblink startle? An examination of the motivational properties of anger. *Dissertation Abstracts International, 70*, 702.

Thibodeau, R. (2011). Approach and withdrawal actions modulate the startle reflex independent of affective valence and muscular effort. *Psychophysiology, 48*, 1011-1014. doi: 10.1111/j.1469-8986.2010.01159.x

Tiggemann, M., & Slater, A. (2001). A test of objectification theory in former dancers and non-dancers. *Psychology of Women Quarterly, 25*, 57-64. doi: 10.1111/1471-6402.00007

Tomarken, A., Davidson, R., & Henriques, J. (1990). Resting frontal brain asymmetry predicts affective responses to films. *Journal of Personality and Social Psychology, 59,* 791-801. doi: 10.1037/0022-3514.59.4.791

Tomarken, A., Davidson, R., & Wheeler, R., & Doss, R. (1992). Individual differences in anterior brain asymmetry and fundamental dimensions of emotion. *Journal of Personality and Social Psychology, 62,* 676-687. doi: 10.1037/0022-3514.62.4.676

Tracy, Robins, & Tangney, J. (2007). *Self-conscious emotions: Theory and research.* New York: Guilford Press.

Vrana, S. (1994). Startle reflex response during sensory modality specific disgust, anger, and neutral imagery. *Journal of Psychophysiology, 8,* 211-218.

Vrana, S., Cuthbert, B., & Lang, P. (1989). Processing fearful and neutral sentences: Memory and heart rate change. *Cognition and Emotion, 3,* 179-195. doi: 10.1080/02699938908415240

Vrana, S., & Lang, P. (1990). Fear imagery and the startle-probe reflex. *Journal of Abnormal Psychology, 99,* 189-197. doi: 10.1037/0021-843X.99.2.189

Vrana, S., Spence, E., & Lang, P. (1988). The startle probe response: A new measure of emotion? *Journal of Abnormal Psychology, 97,* 487-491. doi: 10.1037/0021-843X.97.4.487

Watson, C. (2004). The sartorial self: William James's philosophy of dress. *History of Psychology, 7,* 211-224. doi: 10.1037/1093-4510.7.3.211

Watson, D., & Tellegen, A. (1985). Toward a consensual structure of mood. *Psychological Bulletin, 98,* 219-235. doi: 10.1037/0033-2909.98.2.219

Watson, D., Wiese, D., Vaidya, J., & Tellegen, A. (1999). The two general activation systems of affect: Structural findings, evolutionary considerations, and psychobiological evidence. *Journal of Personality and Social Psychology, 76,* 820-838. doi: 10.1037/0022-3514.76.5.820

Weiner, B. (1985). An attributional theory of achievement motivation and emotion. *Psychological Review, 92,* 548-573. doi: 10.1037/0033-295X.92.4.548

Wicker, F., Payne, G., & Morgan, R. (1983). Participant descriptions of guilt and shame. *Motivation and Emotion, 7,* 25-39. doi: 10.1007/BF00992963

Witvliet, C., & Vrana, S. (1995). Psychophysiological responses as indices of affective dimensions. *Psychophysiology, 32,* 436-443. doi: 10.1111/j.1469-8986.1995.tb02094.x

Witvliet, C., & Vrana, S. (2000). Emotional imagery, the visual startle, and covariation bias: An affective matching account. *Biological Psychology, 52,* 187-204. doi: 10.1016/S0301-0511(00)00027-2

Yartz, A., & Hawk, L. (2002). Addressing the specificity of affective startle modulation: Fear versus disgust. *Biological Psychology, 59,* 55-68. doi: 10.1016/S0301-0511(01)00121-1

Zeelenberg, M., & Breugelmans, S. (2008). The role of interpersonal harm in distinguishing regret from guilt. *Emotion, 8,* 589-596. doi: 10.1037/a0012894

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